SDMS US EPA REGION V -1

SOME IMAGES WITHIN THIS DOCUMENT MAY BE ILLEGIBLE DUE TO BAD SOURCE DOCUMENTS.

157235
NPL-U20-2-12-R5

HRS DOCUMENTATION RECORD--REVIEW COVER SHEET

Name of Site: Sauget Area 1

EPA Identification No.:	Dead Creek Area G (Sauget I)	-	ILD 981 953 623
	Waggoner Trucking Company	-	ILD 984 809 269
	H.H. Hall Excavation Pit	-	ILD 984 809 251
	H.H. Hall Construction Co.	-	ILD 982 073 603
	Dead Creek Segment A (Sauget I)	-	ILD 984 809 277
	Dead Creek	-	ILD 980 792 006
	Dead Creek Segments C-F (Sauget I)	-	ILD 984 809 285
	Sauget Monsanto Illinois Landfills	-	ILD 980 614 176

Contact Persons

Site Investigation:	U.S. Environmental Protection Agency (EPA)	
	Alan Altur	(312) 886-0390
Documentation Record:	PRC Environmental Management, Inc. (PRC)	
	Eric Morton	(312) 856-8797
	Julie Kaiser	(703) 556-2585
	Christopher Scott	(312) 856-8780
	Sandy Anagnostopoulos	(312) 946-6476

Pathways, Components, or Threats Not Evaluated

The Hazard Ranking System (HRS) evaluation performed on the Sauget Area 1 site (Figures 1 and 2 of the documentation record) addresses the threat of contamination of air and surface water.

Ground water data indicates that ground water contamination attributable to the Sauget Area 1 site is present. However, the ground water pathway is not being evaluated because ground water is not used as a drinking water source in the area resulting in minimal target values for this pathway.

Several residences are located adjacent to and have unrestricted access to portions of the Sauget Area 1 site. However, the soil exposure pathway is not being evaluated because areas of contaminated soil attributable to the site have not been documented on residential properties resulting in minimal targets for this pathway.

HRS DOCUMENTATION RECORD

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	Sauget Monsanto Illinois Landfills	-	ILD 980 614 176

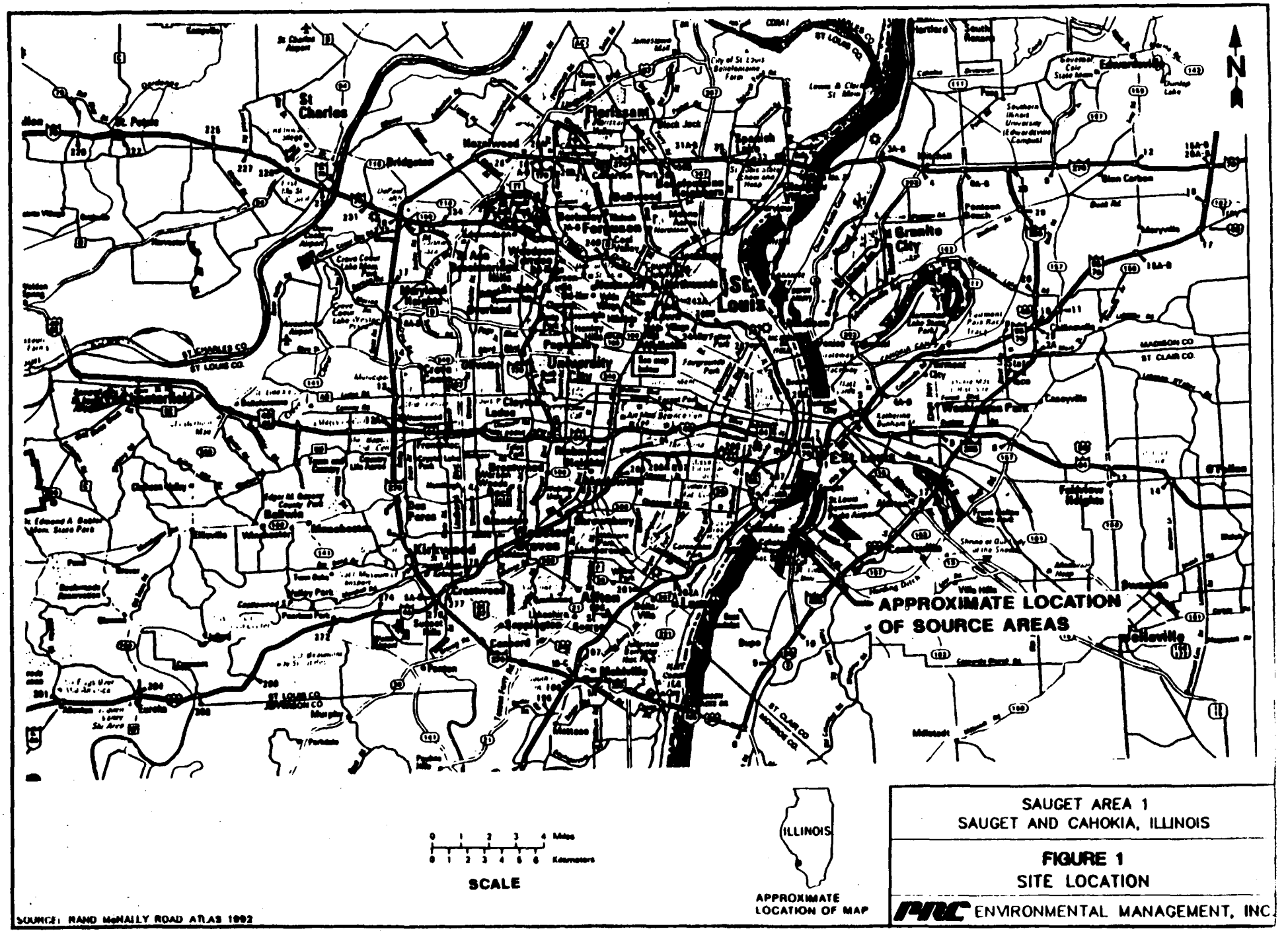
U.S. EPA Region	:	5	Date Prepared: May 20, 1996
Street Address of Site	:	Various in Cahokia and Sauget	
County and State	:	St. Clair County, Illinois	
General Location in the State	:	Western Central Illinois	
Topographic Map	:	Cahokia, Illinois	

	Latitude:	Longitude:
Dead Creek Area G (Sauget I)	38° 35' 23.0"	90° 10' 35.0"
Waggoner Trucking Company	38° 35' 10.0"	90° 10' 20.0"
H.H. Hall Excavation Pit	38° 35' 05.0"	90° 10' 50.0"
H.H. Hall Construction Co.	38° 34' 56.0"	90° 10' 25.0"
Dead Creek Segment A (Sauget I)	38° 35' 35.0"	90° 10' 15.0"
Dead Creek	38° 35' 09.0"	90° 10' 22.5"
Dead Creek Segments C-F (Sauget I)	38° 33' 50.0"	90° 11' 25.0"
Sauget Monsanto Illinois Landfill	38° 35' 50.0"	90° 11' 20.0"

Refer to Figure 1 for site location.

Scores	
Air Pathway	72.80
Ground Water Pathway	NE[1]
Soil Exposure Pathway	NE
Surface Water Pathway	100.0
HRS SITE SCORE	61.85

[1]NE = Not evaluated



SOURCE: RAND McNALLY ROAD ATLAS 1992

SAUGET AREA 1
SAUGET AND CAHOKIA, ILLINOIS

FIGURE 1
SITE LOCATION

ENVIRONMENTAL MANAGEMENT, INC.

WORKSHEET FOR COMPUTING HRS SITE SCORE

		S	S^2
1.	Ground Water Migration Pathway Score (S_{gw}) (from Table 3-1, line 13)	NE	NE
2a.	Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	100	10,000
2b.	Ground Water to Surface Water Migration Component (from Table 4-25, line 28)	NE	NE
2c.	Surface Water Migration Pathway Score (S_{sw}) Enter the larger of lines 2a and 2b as the pathway score.	100	10,000
3.	Soil Exposure Pathway Score (S_s) (from Table 5-1, line 22)	NE	NE
4.	Air Migration Pathway Score (S_a) (from Table 6-1, line 12)	72.80	5,299.84
5.	Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		15,299.84
6.	**HRS Site Score** Divide the value on line 5 by 4 and take the square root		61.85

SURFACE WATER OVERLAND FLOOD MIGRATION COMPONENT SCORESHEET

Factor Categories and Factors			Maximum Value	Value Assigned	
Drinking Water Threat					
	Likelihood of Release				
1.	Observed Release		550	550	
2.	Potential to Release by Overland Flow				
	2a.	Containment	10	NE	
	2b.	Runoff	25	NE	
	2c.	Distance to Surface Water	25	NE	
	2d.	Potential to Release by Overland Flow [lines 2a x (2b +2c)]	500	NE	
3.	Potential to Release by Flood				
	3a.	Containment (Flood)	10	NE	
	3b.	Flood Frequency	50	NE	
	3c.	Potential to Release by Flood [lines 3a x 3b]	500	NE	
4.	Potential to Release [lines 2d + 3c, subject to a maximum of 500]		500	NE	
5.	Likelihood of Release [higher of lines 1 and 4]		550		550
	Waste Characteristics				
6.	Toxicity/Persistence		a	10,000	
7.	Hazardous Waste Quantity		a	10,000	
8.	Waste Characteristics		100		100
	Targets				
9.	Nearest Intake		50	0	
10.	Population				
	10a.	Level I Concentrations	b	0	
	10b.	Level II Concentrations	b	0	
	10c.	Potential Contamination	b	0	
	10d.	Population [lines 10a + 10b + 10c]	b	0	
11.	Resources		5	5	
12.	Targets [lines 9 + 10d + 11]		b		5
	Drinking Water Threat Score				
13.	Drinking Water Threat Score [(lines 5 x 8 x 12)/82,500, subject to a maximum of 100]		100		3.33

NE = Not Evaluated

SURFACE WATER OVERLAND FLOOD MIGRATION COMPONENT SCORESHEET (Cont.)

	Factor Categories and Factors	Maximum Value	Value Assigned
Human Food Chain Threat			
	Likelihood of Release		
14.	Likelihood of Release [same value as line 5]	550	550
	Waste Characteristics		
15.	Toxicity/Persistence/Bioaccumulation	a	5×10^{8}
16.	Hazardous Waste Quantity	a	1×10^{4}
17.	Waste Characteristics	1,000	1,000
	Targets		
18.	Food Chain Individual	50	20
19.	Population		
	19a. Level I Concentrations	b	0
	19b. Level II Concentrations	b	0
	19c. Potential Human Food Chain Contamination	b	3.34×10^{-4}
	19d. Population [lines 19a + 19b + 19c]	b	3.34×10^{-4}
20.	Targets [lines 18 + 19d]	b	20.000334
	Human Food Chain Threat Score		
21.	Human Food Chain Threat Score [(lines 14 x 17 x 20)/82,500, subject to a maximum of 100]	100	100

SURFACE WATER OVERLAND FLOOD MIGRATION COMPONENT SCORESHEET (Cont.)

	Factor Categories and Factors	Maximum Value	Value Assigned
Environmental Threat			
	Likelihood of Release		
22.	Likelihood of Release [same value as line 5]	550	550
	Waste Characteristics		
23.	Ecosystem Toxicity/Persistence/ Bioaccumulation	a	5×10^8
24.	Hazardous Waste Quantity	a	10,000
25.	Waste Characteristics	1,000	1,000
	Targets		
26.	Sensitive Environments		
	26a. Level I Concentrations	b	0
	26b. Level II Concentrations	b	50
	26c. Potential Contamination	b	0.2611
	26d. Sensitive Environments [lines 26a + 26b + 26c]	b	50.2611
27.	Targets [value from line 26d]	b	50.2611
	Environmental Threat Score		
28.	Environmental Threat Score [(lines 22 x 25 x 27)/82,500, subject to a maximum of 60]	60	60
	Surface Water Overland/Flood Migration Component Score for a Watershed		
29.	Watershed Score[c] [lines 13 + 21 + 28, subject to a maximum of 100]	100	100
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE			
30.	Component Score (S_{of})[c] [highest score from line 29 for all watersheds evaluated, subject to a maximum of 100]	100	100

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] Do not round to nearest integer.

AIR MIGRATION PATHWAY SCORESHEET

	Factor Categories and Factors	Maximum Value	Value Assigned	
	Likelihood of Exposure			
1.	Observed Release	550	550	
2.	Potential to Release			
	2a. Gas Potential to Release	500	NE	
	2b. Particulate Potential to Release	500	NE	
	2c. Potential to Release [higher of lines 2a and 2b]	500	NE	
3.	Likelihood of Release [higher of lines 1 and 2c]	550		550
	Waste Characteristics			
4.	Toxicity/Mobility	a	2,000	
5.	Hazardous Waste Quantity	a	10,000	
6.	Waste Characteristics	100		56
	Targets			
7.	Nearest Individual	50	20	
8.	Population			
	8a. Level I Concentrations	b	NE	
	8b. Level II Concentrations	b	0	
	8c. Potential Contamination	b	169	
	8d. Population [lines 8a + 8b + 8c]	b	169	
9.	Resources	5	5	
10.	Sensitive Environments			
	10a. Actual Contamination	c	NE	
	10b. Potential Contamination	c	1	
	10c. Sensitive Environments [lines 10a + 10b]	c	1	
11.	Targets [lines 7 + 8d + 9 + 10c]	b		195

AIR MIGRATION PATHWAY SCORE

12.	Pathway Score (S_a) [(lines 3 x 6 x 11)/82,500][d]	100		72.80

[a] Maximum value applies to waste characteristics category.
[b] Maximum value not applicable.
[c] No specific maximum value applies to factor. However, pathway score based solely on sensitive environments is limited to a maximum of 60.
[d] Do not round to nearest integer.

REFERENCES

Reference Number	Description of the Reference
1	U.S. Environmental Protection Agency (EPA). *Hazard Ranking System*. Final Rule 55 FR 51532-51667. December 14, 1990.
2	EPA. *Superfund Chemical Data Matrix*. June 30, 1994. 76 pages.
3a	Ecology & Environment, Inc. (E&E). *Expanded Site Investigation Dead Creek Project Sites at Cahokia/Sauget, Illinois*. Volume 1 of 2. May 1988. 457 pages. (Page numbers on selected pages boldened by PRC).
3b	E&E. *Expanded Site Investigation Dead Creek Project Sites at Cahokia/Sauget, Illinois*. Volume 2 of 2. May 1988. 549 pages.
4a	Illinois Environmental Protection Agency (IEPA). *CERCLA Screening Site Inspection Report*. Volume 1 of 2. 1992. 130 pages.
4b	IEPA. *CERCLA Screening Site Inspection Report*. Volume 2 of 2. 1992. 162 pages.
5	Geraghty & Miller, Inc. *Site Investigation for Dead Creek Sector B and Sites L and M, Sauget-Cahokia, Illinois*. March 1992. 456 pages.
6	The Avendt Group, Inc. *Site Investigation/Feasibility Study for Creek Segment A*. Volume 1 of 2. June 1990. 333 pages. Plate 1, Aerial Photograph. Plate 2, Topographic Survey. Plate 3, Stormwater Collection Facility Site Plan and Profile.
7	EPA. *Thermal Infrared Survey of Hazardous Waste Sites, East St. Louis, Illinois*. February 1981. 18 pages.
8	U.S. Geological Survey (USGS). 1954. Webster Groves Quadrangle, Missouri-Illinois, 7.5-Minute Series Topographic Map. Photorevised 1968 and 1974. Cahokia Quadrangle, Illinois-Missouri, 7.5-Minute Series Topographic Map. Photorevised 1968 and 1974. Granite City Quadrangle, Illinois-Missouri, 7.5-Minute Series Topographic Map. Photorevised 1982. French Village Quadrangle, Illinois, 7.5-Minute Series Topographic Map. Photorevised 1982. Monk's Mound Quadrangle, Illinois, 7.5-Minute Series Topographic Map. Photorevised 1968 and 1974. Clayton Quadrangle, Missouri, 7.5-Minute Series Topographic Map. Photorevised 1968 and 1974. 4-Mile Radius Map Modified by PRC Environmental Management, Inc. (PRC). 1 page.
9	Village of Monsanto. 1932. Sewer System, Key Plan for Proposed Sewer Lines. Prepared by B.C. McCurdy, engineer. Map obtained during review of IEPA files. May 1993. 1 page.

Reference Number	Description of the Reference
10	Memorandum Regarding Aggregation of Sauget Area 1 Sites. From Tim Murphy, Site Assessment Manager, IEPA. To Alan Altur, Illinois Site Assessment Manager, EPA. February 20, 1992. 15 pages.
11	Author Unknown. Aerial Photograph Depicting Sauget Area as of June 27, 1950. Photograph obtained during review of IEPA files on May 1993. 1 page.
12	Author Unknown. Aerial Photograph depicting Sauget Area as of July 12, 1955. Photograph obtained during review of IEPA files on May 1993. 1 page.
13	IEPA. *Preliminary Hydrogeologic Investigation in the Northern Portion of Dead Creek and Vicinity*. April 1981. 102 pages.
14	Revised Trip Report for Site Visit to Sauget Areas 1 and 2. Sauget, Illinois, May 3 and 4, 1993. From Eric Morton, Project Manager, PRC. To Alan Altur, Illinois Site Assessment Manager, EPA. May 14. 25 pages.
15a	PRC. Validation of Data Obtained from Cases U-4432/U-4442 Organic Results. 100 pages. Attachment A includes original data obtained from samples collected by E&E during the expanded site investigation. June 1993. 471 pages. (Some pages difficult to read; original of poor quality).
15b	PRC. Validation of Data Obtained from Cases U-4432/U-4442 Inorganic Results. 27 pages. Attachment A includes original data obtained from samples collected by E&E during the expanded site investigation. June 1993. 161 pages.
15c	PRC. Validation of Data Obtained from Cases U-4906/U-4928/U-4971/U-4989 Organic Results. 105 pages. Attachment A includes original data obtained from samples collected by E&E during the expanded site investigation. June 1993. 538 pages.
15d	Reference deleted.
15e	PRC. Validation of Data Obtained from Case U-4474 Organic Results. 123 pages. Attachment A includes original data obtained from samples collected by E&E during the expanded site investigation. June 1993. 550 pages.
15f	PRC. Validation of Data Obtained from Case U-4474 Inorganic Results. 28 pages. Attachment A includes original data obtained from samples collected by E&E during the expanded site investigation. June 1993. 117 pages.
15g	PRC. Validation of Data Obtained from Case U-4465 Organic Results. 117 pages. Attachment A includes original data obtained from samples collected by E&E during the expanded site investigation. June 1993. 551 pages.

Reference Number	Description of the Reference
15h	PRC. Validation of Data Obtained from Case U-4465 Inorganic Results. 28 pages. Attachment A includes original data obtained from samples collected by E&E during the expanded site investigation. June 1993. 104 pages.
15i	PRC. Validation of Data Obtained from Cases U-4727/U-4738/U-4767 Organic Results. 80 pages. Attachment A includes original data obtained from samples collected by E&E during the expanded site investigation. June 1993. 449 pages.
15j	PRC. Validation of Data Obtained from Cases U-4727/U-4738/U-4767 Inorganic Results. 21 pages. Attachment A includes original data obtained from samples collected by E&E during the expanded site investigation. June 1993. 157 pages.
15k	PRC. Validation of Data Obtained from Cases U-4835/U-4846/U-4863/U-4872 Organic Results. 93 pages. Attachment A includes original data obtained from samples collected by E&E during the expanded site investigation. June 1993. 475 pages.
15l	PRC. Validation of Data Obtained from Cases U-4835/U-4846/U-4863/U-4872 Inorganic Results. 24 pages. Attachment A includes original data obtained from samples collected by E&E during the expanded site investigation. June 1993. 250 pages.
15m	PRC. Validation of Data Obtained from Cases U-4618/U-4651 Organic Results. 74 pages. Attachment A includes original data obtained from samples collected by E&E during the expanded site investigation. June 1993. 372 pages.
15n	PRC. Validation of Data Obtained from Cases U-4618/U-4651 Inorganic Results. 18 pages. Attachment A includes original data obtained from samples collected by E&E during the expanded site investigation. June 1993. 109 pages.
16	From Merz, E.W., Sanitarian, Mississippi Basin. Memorandum regarding alleged chemical discharge to Dead Creek. To the Bureau of Water Pollution Control, Surveillance Section. April 8, 1971. Memorandum obtained during review of IEPA files on May 1993. 2 pages.
17	From Merz, E.W., Sanitarian, Mississippi Basin. Memorandum regarding alleged chemical discharge to Dead Creek and ensuing inspection of Dead Creek. To Bureau of Water Pollution Control. March 16, 1971. Memorandum obtained during review of IEPA files on May 1993. 1 page.
18	Author Unknown. Aerial Photograph depicting Sauget Area as of September 19, 1937. Photograph obtained during review of IEPA files. May 1993. 1 page.

Reference Number	Description of the Reference
19	Memorandum regarding Cerro Copper Drum Incident of September 20, 1989. From Tom Miller, IEPA On-Scene Coordinator. To Division of Land Pollution Control (DLPC) Division File. September 29, 1989. 9 pages.
20	Letter regarding pole-drilling incident of September 20, 1989. From Joseph Grana, Manager of Environmental and Energy Affairs, Cerro Copper Products Co. (Cerro). To Paul Takacs, IEPA, DLPC. October 4, 1989. 2 pages.
21	Letter regarding possible health effects associated with substances found in samples collected from boring at which incident of September 20, 1989 took place. From Thomas Long, Senior Toxicologist, Environmental Toxicology Program, Illinois Department of Public Health (IDPH). To Robert Gussmann. May 17, 1990. 4 pages.
22	U.S. Department of Commerce, Census Bureau. 1990. Census tracts and maps for 4-mile radius of site. 7 pages.
23	Manufacturer's News, Inc. 1993. Illinois Manufacturers Directory. 4 pages.
24	Illinois Department of Conservation (IDOC). Memorandum regarding wetland determinations for Dead Creek near Sauget, St. Clair County, Illinois (with photographs taken by IEPA attached). From W.E. McClean, Division of Natural Heritage. To Tom Crause, IEPA. July 23, 1992. 19 pages.
25	U.S. Department of the Interior (DOI). National Wetlands Inventory Map, Cahokia, Illinois-Missouri. Fish and Wildlife Service. March 1985. Modified by PRC. 1 page.
26	DOI. National Wetlands Inventory Map, Webster Groves, Missouri-Illinois. Fish and Wildlife Service. April 1984. 1 page.
27	DOI. National Wetlands Inventory Map, Oakville, Missouri-Illinois. Fish and Wildlife Service. April 1984. 1 page.
28	Author Unknown. *Report on Industrial Waste Discharge from Industries at Monsanto*. Interview with Mr. McCurdy, City Engineer for the Village of Monsanto. Prepared by Senior Sanitary Engineer, affiliation unknown, name illegible. March 6, 1942. 3 pages.
29	DOI. 30 by 60 Minute Series (Topographic) Map, St. Louis, Missouri-Illinois. USGS. 1985. Modified by PRC as Figure 11 of the Documentation Record.
30	DOI. 30 by 60 Minute Series (Topographic) Map, Festus, Missouri-Illinois. USGS. 1985. Modified by PRC as Figure 11 of the Documentation Record.

Reference Number	Description of the Reference
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32	Author Unknown. Aerial Photograph Depicting Sauget Area as of July 9, 1962. Photograph obtained during review of IEPA files on May 1993. 1 page.
33	Author Unknown. Aerial Photograph Depicting Sauget Area as of March 3, 1968. Photograph obtained during review of IEPA files on May 1993. 1 page.
34	Author Unknown. Aerial Photograph Depicting Sauget Area as of July 31, 1974. Photograph obtained during review of IEPA files on May 1993. 1 page.
35	Record of Telephone Conversation Regarding Public Community Drinking Water Intakes Along the Mississippi River. Between Eric Morton, Environmental Scientist, PRC, and Liam McDonnel, IEPA, Division of Public Water Supply. July 8, 1993. 1 page.
36	Record of Telephone Conversation Regarding Commercial Fishing on the Mississippi River. Between Julie Kaiser, Environmental Scientist, PRC, and Ed Walsh, IDOC, Streams Program. August 6, 1993. 1 page.
37	Letter Regarding Mammals, Reptiles, and Amphibians near the Sauget Area 1 Site. From Scott R. Ballard, Natural Heritage Biologist, IDOC. To Eric Morton, PRC. July 21, 1993. 4 pages.
38	Letter Regarding Recent Flooding of Creek Segment B (Source 2). From Paul Takacs, Project Manager, IEPA. To Alan Altur, Illinois Site Assessment Manager, EPA. November 2, 1993. 33 pages.
39	Record of Telephone Conversation Regarding the Reporting of Detection Limits. Between Eric Morton, Environmental Scientist, PRC, and Ron Turpin, IEPA, Division of Laboratories, Quality Assurance Section. July 21, 1993. 1 page.
40	Record of Telephone Conversation Regarding the Reporting of Detection Limits. Between Eric Morton, Environmental Scientist, PRC, and Gary Hahn, Manager, E & E, Analytical Services Center. July 16, 1993. 1 page.
41	Letter Regarding Sensitive Environments near Sauget, Illinois. From Dan F. Dickneite, Planning Division Chief, Missouri Department of Conservation. To Eric Morton, Environmental Scientist, PRC. July 28, 1993. 1 page.

Reference Number	Description of the Reference
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43	Record of Telephone Conversation Regarding Fisheries. Between Julie Kaiser, Environmental Scientist, PRC, and Don Dufford, IDOC. August 11, 1993. 1 page.
44	Record of Telephone Conversation Regarding Mississippi River Flow Rates. Between Julie Kaiser, Environmental Scientist, PRC, and Jule Bartels, U.S Army Corps of Engineers, St. Louis District. August 13, 1993. 1 page.
45	Record of Telephone Conversation Regarding Fisheries. Between Eric Morton, Environmental Scientist, PRC, and Bill Bertrand, IDOC. July 8, 1993. 1 page.
46	Record of Telephone Conversation Regarding Endangered and Threatened Bird Species on Mississippi River. Between Julie Kaiser, Environmental Scientist, PRC, and Vern Kleen, IDOC. August 3, 1993. 2 pages.
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49	Letter Regarding Sensitive Environments in the Vicinity of Sauget, Illinois. From Richard C. Nelson, Field Supervisor, Fish and Wildlife Service, DOI. To Eric Morton, PRC. August 5, 1993. 3 pages.
50	Letter Regarding 18-Inch Outfall Originating at the Former Midwest Rubber Reclaiming Company Property. From William C. Child, Manager, Division of Land Pollution Control, IEPA. To Richard M. Cohen. April 18, 1990. 3 pages.
51	Letter Regarding Pumping of Surface Water from Creek Segment B (Source 2) to Creek Segment C (Source 3). From Paul Takacs, Project Manager, PRC. To Alan Altur, Illinois Site Assessment Manager, EPA. March 29, 1994. (Letter was misdated March 29, 1993.) 10 pages.
52	Semi-volatile Organic Analytical Results and Volatile Organic Analytical Results for Auger Sample from Hole Drilling Incident on September 20, 1989 (Sample ID: JMG09/22/89-1). Envirometrics. September 25, 1989. 2 pages.
53	IEPA. Memorandum Regarding Validation of Analytical Results for One Sample Delivered to Applied Research & Development Laboratory, Inc. (ARDL, Inc.) on September 27, 1989. From Ron Turpin. To Bob Carson and Gary King. Qualified Results Attached. October 12, 1989. 14 pages.

Reference Number	Description of the Reference
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55	Record of Telephone Conversation Regarding Surface Water Intakes. Between Julie Kaiser, Environmental Scientist, PRC, and Dan Daugherty, Missouri Department of Natural Resources. August 20, 1993. 1 page.
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57	Letter Regarding Wastes Disposed of at Monsanto Company's Landfill. From J.R. McClain, Plant Manager, Monsanto Company (Monsanto). To C.W. Klassen, Technical Secretary, State of Illinois Sanitary Water Board. August 16, 1968. 3 pages.
58	Monsanto Chemical Company. Property History. Claims of title for over 40 county tax ID numbers and lots in Sauget, St. Clair County, Illinois. 1990. 114 pages.
59	Letter Regarding Apparent Tanker Truck Discharges into Dead Creek. From R.L. Schlenger, Supervisor, Mississippi Basin Surveillance Section, IEPA. To Harold Waggoner & Co. August 6, 1971. 1 page.
60	Memorandum Regarding Harold Waggoner & Co. Tanker Truck Wastes. From Michael G. Neumann, Mississippi Direct Sub-Unit, IEPA. To Division of Water Pollution Control, Surveillance Section. February 13 and March 22, 1973. 1 page.
61	Monsanto-J.F. Queeny Plant. Notification of Hazardous Waste Site. May 18, 1981. 2 pages.
62	Monsanto-W.G.Krummrich Plant. Notification of Hazardous Waste Site. May 15, 1981. 2 pages..
63	Letter regarding Additional Flow Rate and Wetlands Information for the Revised Final HRS Documentation Record, Sauget Area 1. From Sandy Anagnostopoulos, PRC. To Jeanne Griffin, U.S. EPA Region 5. April 25, 1996. 2 pages.
64	U.S. Department of Commerce, Environmental Science Services Administration, Environmental Data Service. *Climate Atlas of the United States*. Reprinted in 1977. 7 pages.
65	Illinois Environmental Protection Agency. *Summary of Selected Background Conditions for Inorganics in Soil*. August 1994. 7 pages.

Reference
Number Description of the Reference

Abbreviations

ARDL	=	Applied Research & Development Laboratory, Inc.
Avendt	=	Avendt Group, Inc.
bgs	=	Below ground surface
bsl	=	Below surface level
Cerro Copper	=	Cerro Copper Products Company
DOI	=	U.S. Department of the Interior
E & E	=	Ecology & Environment, Inc.
EPA	=	U.S. Environmental Protection Agency
ESI	=	Expanded Site Investigation
ft	=	feet
ft^2	=	square feet
Geraghty & Miller	=	Geraghty & Miller, Inc.
HRS	=	Hazard Ranking System
HWQ	=	Hazardous waste quantity
IDOC	=	Illinois Department of Conservation
IDPH	=	Illinois Department of Public Health
IEPA	=	Illinois Environmental Protection Agency
Midwest Rubber	=	Midwest Rubber Company
Monsanto	=	Monsanto Chemical Company
NA	=	Not available
NE	=	Not evaluated
NWI	=	National Wetlands Inventory
PCB	=	Polychlorinated biphenyls
PCP	=	Pentachlorophenol
PPE	=	Probable point of entry
ppm	=	Parts per million
PRC	=	PRC Environmental Management, Inc.
Ref.	=	Reference
SCDM	=	Superfund Chemical Data Matrix
SSI	=	Screening Site Investigation
TDL	=	Target distance limit
USGS	=	U.S. Geological Survey
yd^3	=	cubic yards

SUMMARY OF SOURCES EVALUATED

Sources known to contain Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances, pollutants, and contaminants, as defined in CERCLA Section 101(14), were evaluated with the Hazard Ranking System (HRS) and included in the following summary.

The nine sources evaluated were aggregated into one site because they were all associated with similar waste disposal practices of similar contamination; they are located in close proximity to each other and are located in the same watershed, and therefore threaten or have been shown to have impacted similar targets. Due to the close proximity of the sources, the targets for the air pathway also are overlapping. Furthermore, some of the sources have the same generators and transporters. The Illinois Environmental Protection Agency (IEPA) sent an aggregation memorandum to the U.S. Environmental Protection Agency (EPA) in February 1992. The memorandum indicated similarities between the nine Sauget Area 1 sources which allow the sources to be aggregated for HRS scoring.

The Sauget Area 1 site is an aggregation of nine sources in the villages of Sauget and Cahokia, Illinois. The sources include and lie on either side of Dead Creek. Dead Creek originates in the village of Sauget. The creek then flows through residential areas of the village of Cahokia to the Old Prairie duPont Creek. Old Prairie duPont Creek flows for about 2,500 feet before entering the Cahokia Chute, which flows for about 5,700 feet before entering the Mississippi River.

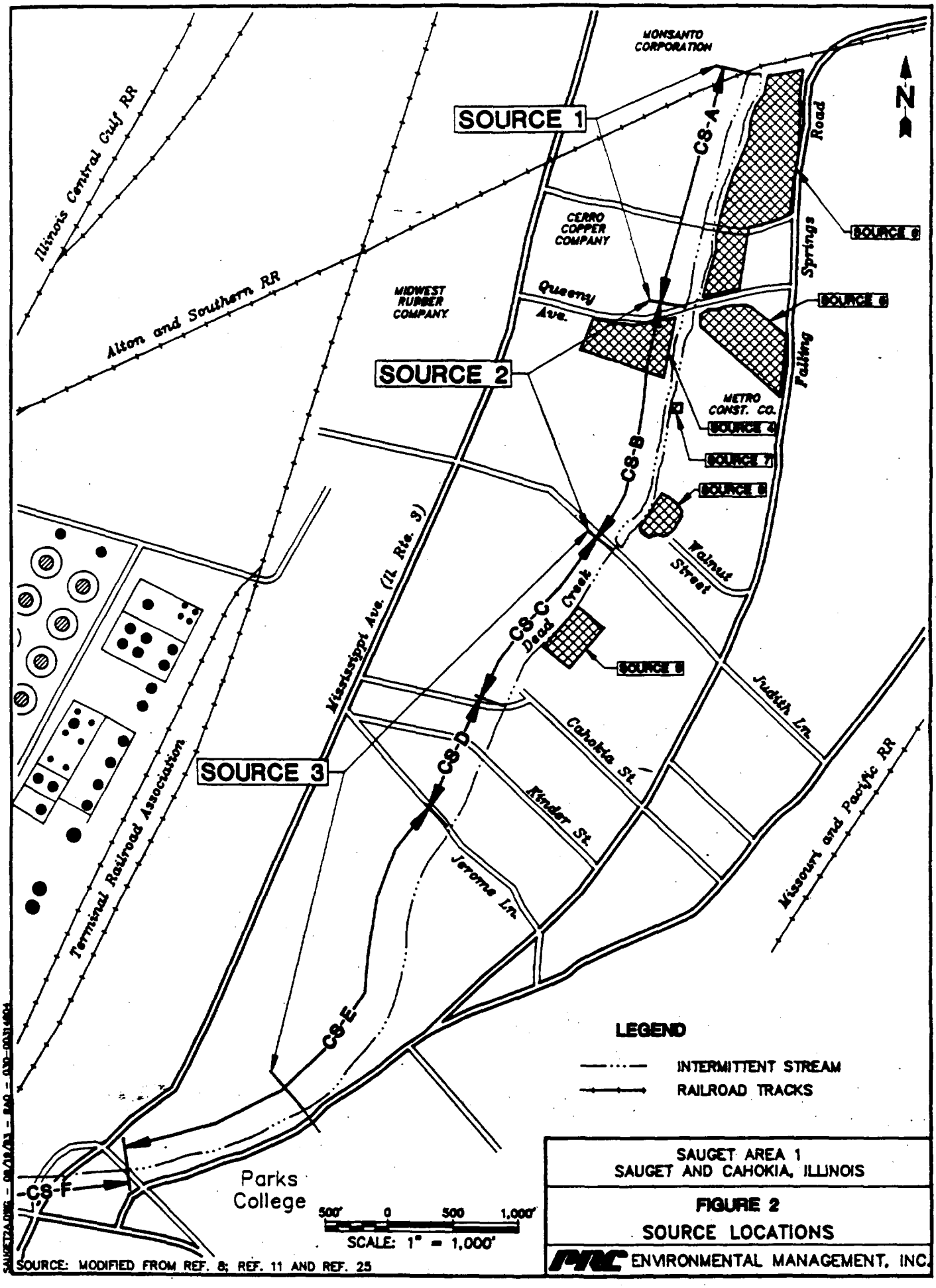
Each of the nine sources is identified below including source number, source description, and source name (as presented in CERCLIS).

Source Number	Source Description	Source Name (CERCLIS)	Source Type
1	CS-A	Dead Creek Area A (Sauget I)	Surface Impoundment
2	CS-B	Dead Creek	Surface Impoundment
3	CS-C through CS-E*	Dead Creek Segments C-F (Sauget I)	Contaminated Soil
4	Source G	Dead Creek	Landfill
5	Source H	Sauget Monsanto Illinois Landfill	Landfill
6	Source I	Sauget Monsanto Illinois Landfill	Landfill
7	Source L	Waggoner Trucking Company	Surface Impoundment
8	Source M	H.H. Hall Excavation Pit	Surface Impoundment
9	Source N	H.H. Hall Construction Co.	Landfill

Note:

* This source represents an area of observed soil contamination within the source named Dead Creek Segments C-F in CERCLIS.

The location of each of these sources is shown in Figure 2.


MONSANTO CORPORATION
SOURCE 1
CS-A
Illinois Central Gulf RR
Alton and Southern RR
CERRO COPPER COMPANY
MIDWEST RUBBER COMPANY
Queeny Ave.
SOURCE 2
SOURCE 6
SOURCE 5
Springs Road
Falling
METRO CONST. CO.
SOURCE 4
SOURCE 7
SOURCE 8
CS-B
CS-C
Dead Creek
Walnut Street
Mississippi Ave. (IL Rte. 3)
SOURCE 3
CS-D
Cahokia St.
Judith Ln.
Kinder St.
Jerome Ln.
Terminal Railroad Association
Missouri and Pacific RR
CS-E
CS-F
Parks College
N
LEGEND
INTERMITTENT STREAM
RAILROAD TRACKS
500' 0 500 1,000'
SCALE: 1" = 1,000'
SOURCE: MODIFIED FROM REF. 8; REF. 11 AND REF. 25
SAUGET AREA 1
SAUGET AND CAHOKIA, ILLINOIS
FIGURE 2
SOURCE LOCATIONS
ENVIRONMENTAL MANAGEMENT, INC.

SOURCE DESCRIPTION

2.2 Source Characterization

Source Number: 1

Source Description: CS-A (surface impoundment)

Source 1 is an impoundment made from the northern 1,750 feet of Dead Creek located north of Queeny Avenue and south of the Alton & Southern Railroad (Ref. 7, p. 10). Aerial photographs indicate Source 1 was impounded some time between 1940 and 1950 (Ref. 11 and Ref. 48). The 1950 aerial photograph shows Source 1 appearing wider and holding more water than downstream segments of the creek (Ref. 11). In 1989, the average width of Source 1 was 59.5 feet. The determination of the average width of Source 1 is based on field activities conducted in 1989 by the Avendt Group, Inc., during a Site Investigation/Feasibility Study for CS-A. During these activities, Source 1 was divided into eight zones and the average width, length, and depth were determined for each zone. Summing the average width of each zone and dividing by eight, results in an average width for Source 1 of 59.5 feet (Ref. 6, p. 56).

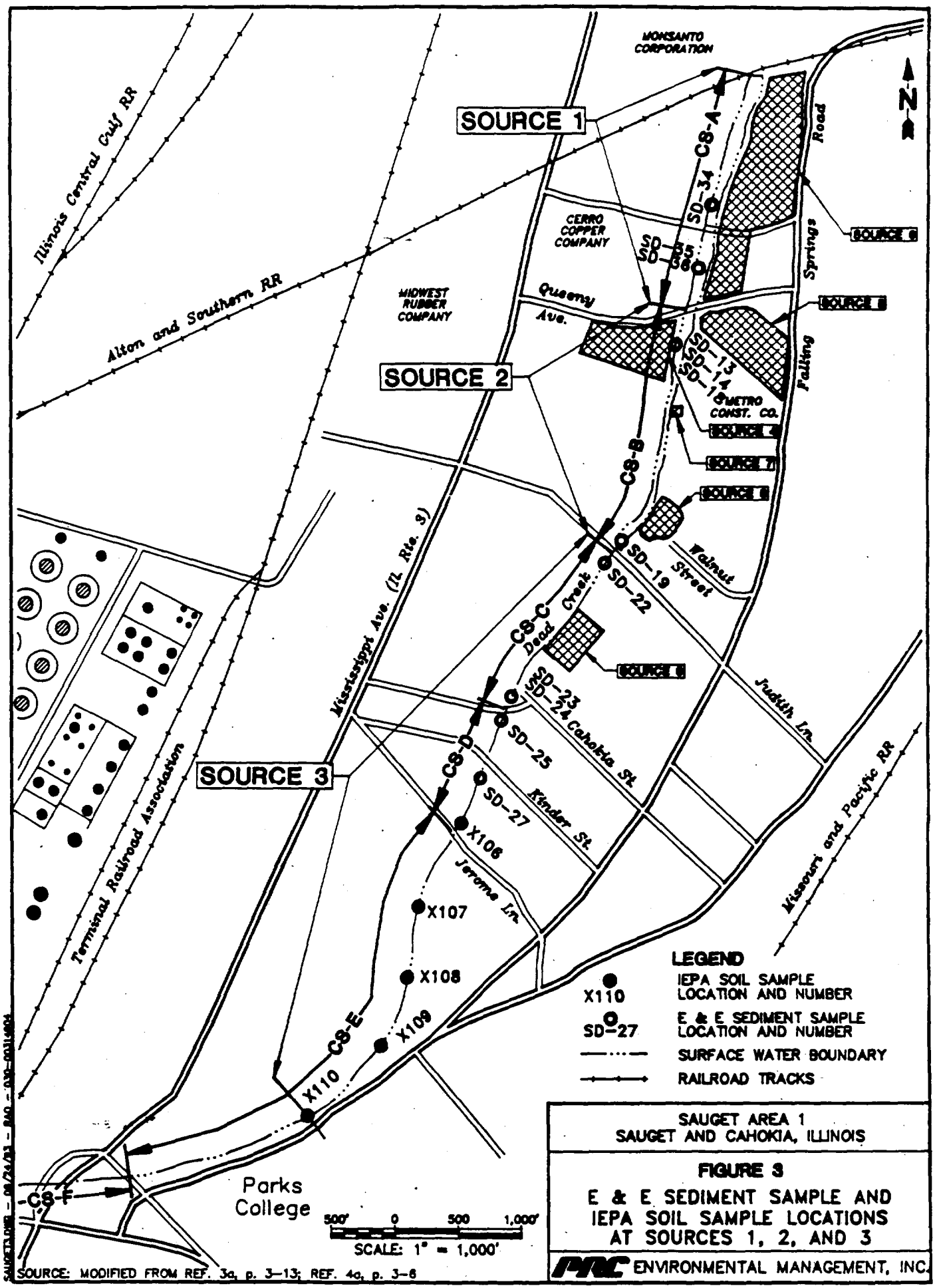
Source 1 is located on property currently owned by the Cerro Copper Products Company (Cerro Copper) (Ref. 6, p. 2). The property was purchased by Cerro Copper and its predecessors in stages beginning in 1927 and ending in 1969 (Ref. 6, p. 2). Source 1 extends from the Alton & Southern Railroad on the north to Queeny Avenue on the south (see Figure 2). A 1990 report prepared by the Avendt Group, Inc. (Avendt), for Cerro Copper states that Dead Creek originated north of the railroad on property owned by the Monsanto Chemical Company (Monsanto) (Ref. 6, pp. 2 and 3). A 1932 map depicting proposed sewer lines in the village of Monsanto, now the village of Sauget, shows Dead Creek originating north of the Alton & Southern Railroad on property owned by Monsanto (Ref. 9). The available portion of the 1932 map does not have a scale; therefore, the U.S. Geological Survey topographic map for the Cahokia Quadrangle was used to determine a scale for the 1932 map. By comparing several measured distances between fixed features on the topographic map to corresponding distances on the 1932 map, an approximate scale was developed for the 1932 map. Using this method, the 1932 map shows Dead Creek originated at least 1,700 feet north of the Alton & Southern Railroad (Ref. 8 and Ref. 9). Aerial photographs suggest that the portion of Dead Creek

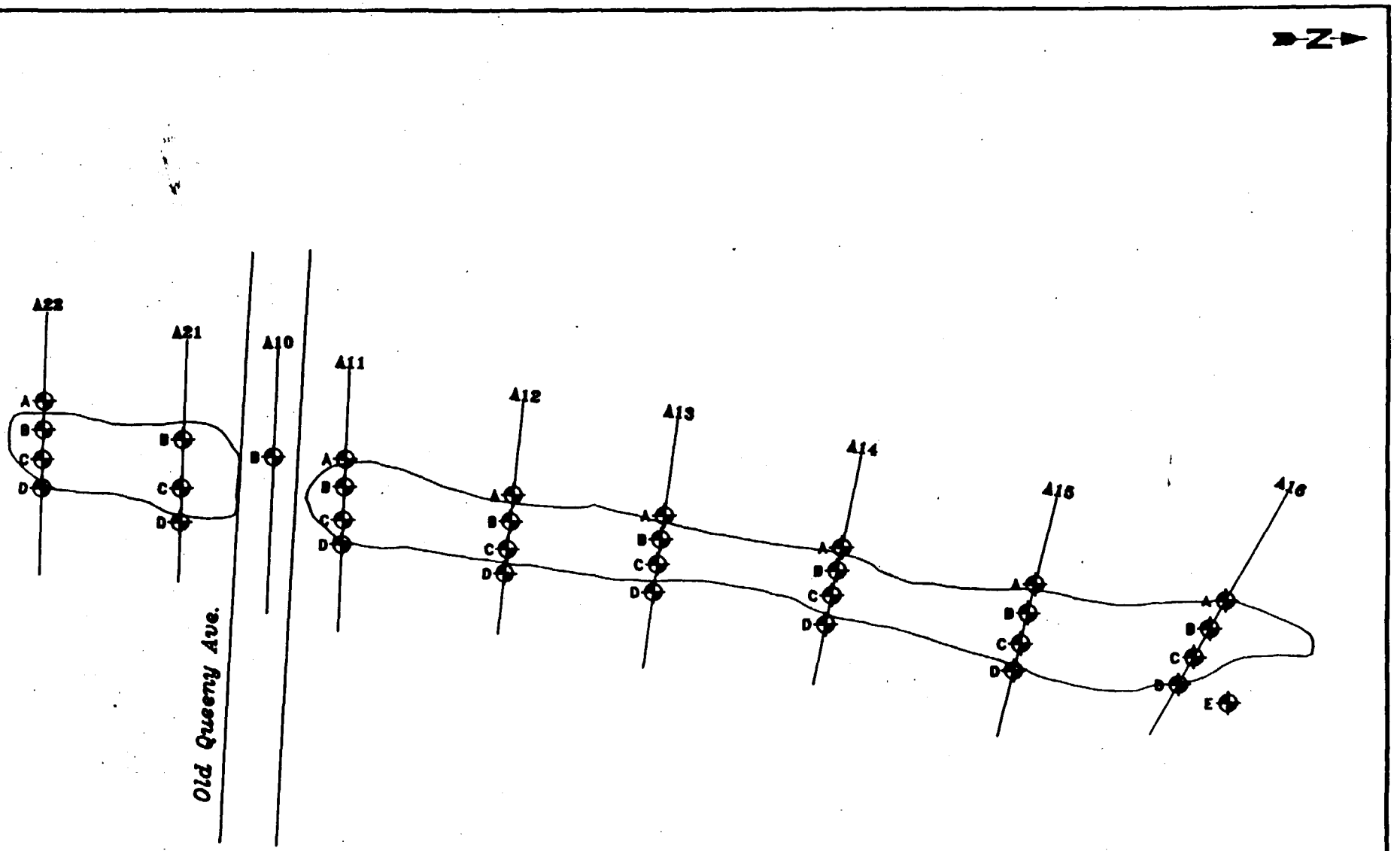
upstream of Source 1 was filled in sometime prior to 1937 (Ref. 18). As a result, Dead Creek has no natural headwaters.

Source 1 was created when the culvert at Queeny Avenue was sealed in response to concerns about hazardous substances in the upper portions of Dead Creek migrating to the lower portions of the creek (Ref. 5, p. 1-3). After the culvert was blocked, Source 1 was graded so water would flow to the north into a catch basin installed by Monsanto. The water entering this catch basin was then pumped to the Cahokia sewage treatment plant (Ref. 13, p. 19). Although drainage from Source 1 was pumped to the Cahokia sewage treatment plant, overflows resulting from flooding or peaks in waste output were routinely routed into Source 1 (Ref. 4a, p. 2-7). Source 1 also received storm water runoff from Cerro Copper through drain pipes in the western bank of Source 1 (Ref. 6, p.5).

Although the culvert separating Source 1 and Source 2 at Queeny Avenue was supposedly sealed (date unknown), according to a 1981 report IEPA observed water flowing downstream from Source 1 to Source 2. The flow may have been the result of a storm sewer in the culvert, but it is also possible that the culvert is not completely sealed (Ref. 13, p. 19). Additional reports to the Bureau of Water Pollution Control indicate that the culvert at Queeny Avenue may not be completely sealed. In March 1971, a Cahokia health officer and two Sauget area residents independently reported observing a yellow substance flowing from Source 1, through the Queeny Avenue culvert, and into Source 2 (Ref. 16, pp. 1 and 2; Ref. 17, p. 1). A subsequent investigation by the sanitarian for the Mississippi Basin revealed no evidence of the yellow substance (Ref. 16, pp. 1 and 2; Ref. 17, p.1). However, these events indicate that hazardous substances may have been migrating downstream from Source 1 after the culvert at Queeny Avenue was blocked.

Several sampling events conducted at Source 1, including an Expanded Site Investigation (ESI) conducted for IEPA in 1987, an investigation for Cerro Copper by the Avendt Group in 1990, and a Screening Site Investigation (SSI) in 1991, have revealed highly elevated levels of organic and inorganic substances in Source 1 (Refs. 3a; 4a; 6) (see Figures 3 and 4 for sampling locations). Hazardous substances found in Source 1 included polychlorinated biphenyls (PCB) (Ref. 6, pp. 27 and 69). A complete list of hazardous substances found at Source 1 is presented in Section 2.4.1 of Source 1. The highest concentrations of volatile and semivolatile organics as well as PCBs have been


SOURCE 1
SOURCE 2
SOURCE 3
MONSANTO CORPORATION
CERRO COPPER COMPANY
MIDWEST RUBBER COMPANY
METRO CONST. CO.
Illinois Central Gulf RR
Alton and Southern RR
Terminal Railroad Association
Mississippi Ave. (IL Rte. 3)
Queeny Ave.
Falling Springs Road
Walnut Street
Judith Ln.
Cahokia St.
Kinder St.
Jerome Ln.
Missouri and Pacific RR
Dead Creek
CS-A
CS-B
CS-C
CS-D
CS-E
CS-F
SD-34
SD-35
SD-36
SD-13
SD-14
SD-15
SD-19
SD-22
SD-23
SD-24
SD-25
SD-27
X106
X107
X108
X109
X110
SOURCE 4
SOURCE 5
SOURCE 6
SOURCE 7
SOURCE 8
Parks College
N
LEGEND
X110 IEPA SOIL SAMPLE LOCATION AND NUMBER
SD-27 E & E SEDIMENT SAMPLE LOCATION AND NUMBER
SURFACE WATER BOUNDARY
RAILROAD TRACKS
500' 0 500 1,000'
SCALE: 1" = 1,000'
SOURCE: MODIFIED FROM REF. 3a, p. 3-13; REF. 4a, p. 3-6
SAUGET AREA 1
SAUGET AND CAHOKIA, ILLINOIS
FIGURE 3
E & E SEDIMENT SAMPLE AND IEPA SOIL SAMPLE LOCATIONS AT SOURCES 1, 2, AND 3
ENVIRONMENTAL MANAGEMENT, INC.



NOT TO SCALE

SOURCE: MODIFIED FROM REF. 6, p. 27

SAUGET AREA 1
SAUGET AND CAHOKIA, ILLINOIS

FIGURE 4

AVENDT GROUP
BORING LOCATIONS AT SOURCE 1

ENVIRONMENTAL MANAGEMENT, INC.

SAUGET4.DWG - 09/01/93 - RAO - 030-00314004

found at the north end of Source 1 (Ref. 6, p. 132). The highest concentrations of heavy metals have been found in the southern half of Source 1 (Ref. 6, p. 132).

As part of a consent decree between IEPA and Cerro Copper, Cerro Copper removed part of the contaminated sediment, soil, and water from Source 1 in 1990. A total of 27,500 tons of contaminated sediments were removed from Source 1 and disposed of at several hazardous waste landfills (Ref. 4a, p. 4-12). Cerro Copper then backfilled the creek bed and covered it with gravel (Ref. 14, p. 2). Access to Source 1 is restricted by a fence surrounding the Cerro Copper property (Ref. 3a, p. 2-7). Currently, Source 1 is level and dry (Ref. 14, p. 1-1).

Source Location:

Source 1 extends from the Alton & Southern Railroad on the north to Queeny Avenue on the south on property owned by Cerro Copper. Source 1 is identified in Figure 2 and is visible in aerial photographs of the site (Ref. 7, p. 10; Ref. 11; and Ref. 48).

Containment:

The following subsections provide information about the pathway-specific containment values for Source 1.

Gas release to air

Currently, a gas release to air is possible because after parts of contaminated sediments were removed from Source 1 in 1991, it was backfilled and covered by gravel (Ref. 14, pp. 2). Furthermore, Source 1 is devoid of vegetation (Ref. 14, pp. 1-1). Therefore, a containment value of 7 was assigned (Ref. 1, Table 6-3, p. 51652).

Particulate release to air

Currently, a particulate release to air is possible because after parts of contaminated sediments were removed from Source 1 in 1991, it was backfilled and covered by gravel (Ref. 14, pp. 2). Furthermore, Source 1 is devoid of vegetation (Ref. 14, pp. 1-1). Therefore, a containment value of 7 was assigned (Ref. 1, Table 6-9, p. 51653).

Release to ground water

The ground water migration pathway was not evaluated.

Release via overland migration or flood

Source 1 has a maintained engineered cover but does not have a functioning and maintained run-on control system and run-off management system (Ref. 4a, p. 2). Therefore, a containment factor value of 9 was assigned (Ref. 1, Table 4-2, p. 51609).

2.4.1 Hazardous Substances

The following list of hazardous substances present at Source 1 is based on the results of source sampling conducted by Ecology & Environment, Inc. (E&E), in 1987 and Avendt in 1990 (Ref. 3a; Ref. 6). Sampling by Avendt in 1990 was conducted prior to any removal of contaminated sediments or liquids from Source 1. Samples showing the highest unqualified results for each substance detected are presented.

Sample designations beginning with an 'SD' refer to sediment samples collected by E&E. Sample designations beginning with an 'A' refer to sediment samples collected by Avendt. The numerical designation in parenthesis at the end of each sample indicates the depth in feet of sample collection. For example, sample A15C (4.5-9) refers to a sample collected between 4.5 and 9 feet below the ground surface of Source 1. Sampling locations are presented in Figure 3 for the E&E sampling event and in Figure 4 for the Avendt sampling event.

Hazardous Substance	Evidence	Reference
1,1-Dichloroethane	A15C (4.5-9)	Ref. 6, p. 115
1,2-Dichlorobenzene	A15C (4.5-9)	Ref..6, p. 117
1,2-Dichloroethene (total)	A16B (9-12)	Ref. 6, p. 115
1,2,4-Trichlorobenzene	A13B (4.5-6)	Ref. 6, p. 117
1,2,4,5-Tetrachlorobenzene	A13B (4.5-6)	Ref. 6, p. 118
1,4-Dichlorobenzene	A16C (2-5)	Ref. 6, p. 117
	SD-36 (1.5-2)	Ref. 3a, p. 3-12; Ref. 15a, p. 98
4-Chloraniline	A23A (19-20)	Ref. 6, p. 117
Antimony	A12B (3-7)	Ref. 6, p. 85
Aroclor 1248	A22B (0-7)	Ref. 6, p. 69
	SD-34 (0-0.5)	Ref. 3a, p. 3-12; Ref. 15a, p. 91
Aroclor 1260	A12D (17-20)	Ref. 6, p. 68
	SD-35 (0-0.5)	Ref. 3a, p. 3-12; 15a, p. 95
Aroclor 1221	A13C (4-8.5)	Ref. 6, p. 68
Aroclor 1232	A16B (9-12)	Ref. 6, p. 69
Aroclor 1254	A12D (6-13)	Ref. 6, p. 68
	SD-35 (0-0.5)	Ref. 3a, p. 3-12; Ref. 15a, p. 95
Arsenic	A12C (4-9)	Ref. 6, p. 85

2.4.1 Hazardous Substances (Continued)

Hazardous Substance	Evidence	Reference
Beryllium	A12B (3-7)	Ref. 6, p. 85
Bis(2-ethylhexyl)phthalate	SD-34 (0-0.5)	Ref. 3a, p. 3-12; Ref. 15a, p. 90
Cadmium	A15C (4.5-9)	Ref. 6, p. 85
	SD-35 (0-0.5)	Ref. 3a, p. 3-12, 15b, p. 26
Chlorobenzene	A16B (9-12)	Ref. 6, p. 115
Chromium	A12C (4-9)	Ref. 6, p. 85
	SD-35 (0-0.5)	Ref. 3a, p. 3-12; Ref. 15b, p.26
Copper	A21C (4-8)	Ref. 6, p. 85
Di-n-octylphthalate	SD-36 (1.5-2)	Ref. 3a, p. 3-12; Ref. 15a, p. 98
Dichlorodifluoromethane	A13B (4.5-6)	Ref. 6, p. 115
Ethylbenzene	A16B (9-12)	Ref. 6, p. 115
Lead	A12B (3-7)	Ref. 6, p. 85
	SD-34 (0-0.5)	Ref. 3a, p. 3-12; Ref. 15b, p. 25
Magnesium	A12A (8-11)	Ref. 6, p. 85
Mercury	A16B (9-12)	Ref. 6, p. 85
Nickel	A11D (8-10)	Ref. 6, p. 85
Pentachlorobenzene	A15C (4.5-9)	Ref. 6, p. 118
Silver	A21C (4-8)	Ref. 6, p. 85
	SD-35	Ref. 15b, p. 26
Tin	SD-34 (0-0.5)	Ref. 3a, p. 3-12; Ref. 15b, p. 25
Trichloroethene	A16B (9-12)	Ref. 6, p. 115
Xylene (total)	A16B (9-12)	Ref. 6, p. 115
Zinc	A12B (3-7)	Ref. 6, p. 85
	SD-35 (0-0.5)	Ref. 3a, p. 3-12; Ref. 15b, p. 26

A study published by IEPA has established mean background levels for naturally occurring and ubiquitous metals in soil samples in the state of Illinois (Ref. 65). A comparison of the metal concentrations detected in Source 1 with these mean background levels shows that the source concentrations are several orders of magnitude greater than state soil levels (Ref. 65, Table 2).

2.4.2 Hazardous Waste Quantity

The hazardous waste quantity (HWQ) for Source 1 is based on the source's area.

2.4.2.1.1 Hazardous Constituent Quantity

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 1.

Sum (pounds) (S): Unknown
Hazardous Constituent Quantity Value: NE

2.4.2.1.2 Hazardous Wastestream Quantity

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 1.

Sum (pounds) (W): Unknown
Hazardous Wastestream Quantity Value: NE

2.4.2.1.3 Volume

Sufficient information is not available to evaluate the depth of Source 1 while it was used as an impoundment. For this reason, the volume of Source 1 was not evaluated.

Dimension of source (yd^3 or gallons) (V): Unknown
Volume Assigned Value: NE

2.4.2.1.4 Area

An American Map Corporation map measurer was used to measure the length of Source 1 from a 1980 aerial photograph. The scale provided on the photograph was then used to determine that Source 1 extends for 1,750 feet (Ref. 7, p. 10). In 1990, Avendt measured the width of Source 1 in several locations. The average width of Source 1 was 59.5 feet (Ref. 6, p. 56). The area of Source 1 is calculated as follows:

1,750 ft x 59.5 ft = 104,125 ft^2
(ft^2 = square feet)

A waste quantity divisor of 13 for surface impoundment is used to calculate the area value as follows (Ref. 1, Table 2-5, p. 51591):

104,125/13 = 8,009.62

Area of source (ft^2) (A): 104,125
Reference(s): 7, p. 10; 6, p. 56
Area Assigned Value: 8,009.62

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ was determined using the area of Source 1. The assigned value for the source was then determined from HRS Table 2-5 (Ref. 1, p. 51591).

Source Hazardous Waste Quantity Value: 8,009.62

SOURCE DESCRIPTION

2.2 Source Characterization

Source Number: 2

Source Description: CS-B (surface impoundment)
Source 2 is an impoundment consisting of about 1,950 feet of Dead Creek (Ref. 5, p. 1-2) from Queeny Avenue on the north to Judith Lane on the south (Ref. 5, p. 1-2 and Ref. 8) (see Figure 2).

Source 2 was created when the culverts at Queeny Avenue and Judith Lane were sealed in response to concerns about pollutants in the upper portions of Dead Creek migrating to the lower portions of the creek (Ref. 5, p. 1-3). Aerial photographs indicate the culvert connecting Source 1 to Source 2 was blocked some time between 1940 and 1950 (Ref. 11 and Ref. 48). Based on aerial photographs, it appears the culvert at the southern end of Source 2 was blocked between 1950 and 1962 (Refs. 11 and 32). The 1962 aerial photograph shows Source 2 appearing wider and holding more water than downstream segments of the creek (Ref. 32). From this photograph, Source 2 is measured to be approximately 56 feet wide (Ref. 32).

An outfall from Midwest Rubber Company (Midwest Rubber) discharged into Source 2 from the late 1940s to the early 1960s (Ref. 13, p. 12). Midwest Rubber had an 18-inch outfall located approximately 200 feet south of Queeny Avenue in Source 2 (Ref. 50, p. 1). According to IEPA, the creek bed downstream of this outfall is "rubberized" (Ref. 50, p.1).

Source 2 also received discharge from Waggoner Trucking Company (Waggoner) operations. Waggoner discharged wash water used to clean industrial waste hauling trucks directly into Source 2. On August 6, 1971, Waggoner was ordered by IEPA to stop discharging to Source 2 (Ref. 59, p. 1). Shortly afterwards, Waggoner indicated that all discharges to Dead Creek had stopped and Source 7 had been constructed and was used to contain the company's wash water (Ref. 13, pp. 12 and 13; Ref. 60, p.1).

Source 2 may also have received runoff from five additional Sauget Area 1 sources, Sources 1, 4, 5, 7, and 8 which are located adjacent to Source 2 (see Figure 2). Before the culvert separating Source 1 and Source 2 was blocked, water from Source 1 flowed into Source 2 and downstream to lower portions of Dead Creek. Source 7, an impoundment for hazardous waste tanker truck wash water, was designed to overflow into Source 2 (Ref. 4a, p. 2-8). Source 8, a surface impoundment (formerly a sand mining pit), is connected directly to Source 2 by a channel that allows water to flow between the two sources (Ref. 5, pp. 1-3).

Although culverts at both the north and south ends of Source 2 have been blocked, water still flows past each culvert. In a 1981 report, IEPA reported observing water flowing downstream from Source 1 to Source 2 at Queeny Avenue (Ref. 13, p. 19). Reports to the Bureau of Water Pollution Control reveal that a Cahokia health officer and two Sauget area residents independently observed a yellow substance flowing from Source 1 to Source 2 (Ref. 16, pp. 1 and 2; Ref. 17, p. 1). In 1981, water was also observed flowing from Source 2 to CS-C, the northern portion of Source 3 (Ref. 13, p. 19). Water flows downstream past the blocked culvert when it reaches an undetermined level in Source 2 (Ref. 13, p. 19).

Water levels in Source 2 vary considerably depending on area precipitation (Ref. 3a, pp. 2-8). During periods of low precipitation, Source 2 becomes completely dry thus exposing the entire creek bed (Ref. 3a, p. 2-8). Local residents have reported periodic smoldering and glowing in the creek bed of Source 2 (Ref. 47). In August 1980, a local resident's dog rolled in the dry creek bed of Source 2 and died of apparent chemical burns (Ref. 13, p. 1). Subsequent sampling revealed elevated levels of phosphorus, heavy metals, and PCBs (Ref. 47). The results of this sampling prompted IEPA to restrict access in September 1980 to Sources 2 and 8 by surrounding both with a snow fence (Ref. 13, p. 1; Ref. 3a, p. 2-57). In October 1982, EPA replaced the snow fence with an 8-foot, chain-link fence surrounding Sources 2 and 8 (Ref. 3a, p. 2-61). Sampling conducted by E&E in 1987 revealed elevated levels of organic and inorganic substances in Source 2 including PCBs (Ref. 3a; Ref. 15a, pp. 31 and 35) (see Figure 3 for sampling locations). A complete listing of hazardous substances found at Source 2 is presented in Section 2.4.1. of Source 2. Currently, the banks of Source 2 are heavily vegetated and debris is scattered throughout the northern half of Source 2 (Ref. 3a, p. 2-8).

During periods of heavy precipitation, IEPA personnel have observed surface water from Source 2 flowing onto Queeny Avenue and Judith Lane (Ref. 38, p. 1). Additionally, during record precipitation levels in the area during Summer 1993, the water level in Source 2 reached a maximum and was pumped out of Source 2 and discharged to Source 3 without any treatment (Ref. 51). At that time, IEPA personnel also observed that as surface water in Source 2 rises, it comes into contact with Source 4 allowing the migration of contaminants from Source 4 to Source 2 (Ref. 38, p. 1).

Source Location:

Source 2 extends from Queeny Avenue on the north to Judith Lane on the south. Source 2 is identified in Figure 2 and is visible in aerial photographs of the site (Refs. 11, 32, and 47).

Containment:

The following subsections provide information about the pathway-specific containment values for Source 2.

Gas release to air

During periods of low precipitation, Source 2 becomes completely dry thus exposing the entire creek bed (Ref. 3a, p. 2-8). Local residents have reported periodic smoldering and glowing in the creek bed of Source 2 (Ref. 47). In August 1980, a local resident's dog rolled in the dry creek bed of Source 2 and died of apparent chemical burns (Ref. 13, p. 1). Thus, a containment value of 10 was assigned (Ref. 1, Table 6-3, p. 51652).

Particulate release to air

Source 2 is a surface impoundment that does not have an impermeable, maintained cover and during periods of low precipitation has become completely dry. It is not surrounded by an engineered windbreak and does not contain a soil cover (Ref. 3a, p. 2-8). Therefore, a containment value of 10 was assigned (Ref 1, Table 6-9, p. 51653).

Release to ground water

The ground water migration pathway was not evaluated.

Release via overland migration or flood

Source 2 does not have a maintained engineered cover or maintained run-on control system and run-off management system (Ref. 5, p. 1-2). Therefore, a containment value of 10 was assigned (Ref. 1, Table 4-2, p. 51609).

2.4.1 Hazardous Substances

The following list of hazardous substances present at Source 2 is based on the results of sediment sampling conducted by E&E in 1987 (Ref. 3a). Samples showing the highest unqualified results for each substance detected are presented.

Sample designations beginning with an 'SD' refer to sediment samples collected by E&E. The numerical designation in parenthesis at the end of each sample indicates the depth in feet of sample collection. Sampling locations are presented in Figure 3 for the E&E sampling event.

Hazardous Substance	Evidence	Reference
1,4-Dichlorobenzene	SD-14 (2-3)	Ref. 3a, p. 3-11; Ref. 15a, p. 14
2-Hexanone	SD-19 (0-0.5)	Ref. 3a, p. 3-11; Ref. 15a, p. 33
Aroclor 1254	SD-19 (0-0.5)	Ref. 3a, p.3-11; Ref. 15a, p. 35
Aroclor 1260	SD-18 (0-0.5)	Ref. 3a, p. 3-11; Ref. 15a, p. 31
Benzo(b)fluoranthene	SD-19 (0-0.5)	Ref. 3a, p. 3-11; Ref. 15a, p. 34
Benzo(g,h,i)perylene	SD-19 (0-0.5)	Ref. 3a, p. 3-11; Ref. 15a, p. 34
Bis(2-ethylhexyl)phthalate	SD-18 (0-0.5)	Ref. 3a, p. 3-11; Ref. 15a, p. 30
Cadmium	SD-14 (2-3)	Ref. 3a, p. 3-11; Ref. 15b, p. 6
Chromium	SD-14 (2-3)	Ref. 3a, p. 3-11; Ref. 15b, p. 6
Ethylbenzene	SD-14 (2-3)	Ref. 3a, p. 3-11; Ref. 15a, p. 13
Iron	SD-19 (0-0.5)	Ref. 3a, p. 3-11; Ref. 15b, p. 11
Lead	SD-19 (0-0.5)	Ref. 3a, p. 3-11; Ref. 15b, p.11
Mercury	SD-19 (0-0.5)	Ref. 3a, p. 3-11; Ref. 15b, p.11
Silver	SD-19 (0-0.5)	Ref. 3a, p. 3-11; Ref. 15b, p. 11
Thallium	SD-19 (0-0.5)	Ref. 3a, p. 3-11; Ref. 15b, p. 11
Tin	SD-13 (0-0.5)	Ref. 3a, p. 3-11; Ref. 15b, p. 5
Toluene	SD-14 (2-3)	Ref. 3a, p. 3-11; Ref. 15a, p.13
Zinc	SD-14 (2-3)	Ref. 3a, p. 3-11; Ref. 15b, p. 6

A study published by IEPA has established mean background levels for naturally occurring and ubiquitous metals in soil samples in the state of Illinois (Ref. 65). A comparison of the metal

concentrations detected in Source 2 with these mean background levels shows that the source concentrations are several orders of magnitude greater than state soil levels (Ref. 65, Table 2).

2.4.2 Hazardous Waste Quantity

The HWQ for Source 2 is based on the source's area.

2.4.2.1.1 Hazardous Constituent Quantity

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 2.

Sum (pounds) (S): Unknown

Hazardous Constituent Quantity Value: NE

2.4.2.1.2 Hazardous Wastestream Quantity

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 2.

Sum (pounds) (W): Unknown

Hazardous Wastestream Quantity Value: NE

2.4.2.1.3 Volume

Sufficient information is not available to determine the depth of Source 2 while it was used as an impoundment. For this reason, the volume of Source 2 was not evaluated.

Dimension of source (yd^3 of gallons) (V): Unknown
Volume Assigned Value: NE

2.4.2.1.4 Area

Source 2 extends for about 1,950 feet (Ref. 5, p. 1-2). The length of Source 2 in a 1962 aerial photograph was 2.80 inches (Ref. 32). Because the length of Source 2 has been measured to be 1,950 feet, the scale used for the 1962 aerial photograph was 2.80 inches equals 1,950 feet (Ref. 5, p. 1-2 and Ref. 32). A ruler was used to measure the width of Source 2 from a 1962 aerial photograph. In this photograph the average width of Source 2 was 0.08 inches (Ref. 32). The width of Source 2 is calculated as follows:

0.08 in x 1,950 ft/2.80 in = 56 ft

The area of Source 2 is calculated as follows:

1,950 ft x 56 ft = 109,200 ft^2

A waste quantity divisor of 13 for surface impoundment is used to calculate the area value as follows (Ref. 1, Table 2-5, p. 51591):

109,200/13 = 8,400

Area of source (ft^2) (A): 109,200
Reference(s): 5, p. 1-2, 32
Area Assigned Value: 8,400

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ was determined using the area of Source 2. The assigned value for the source was then determined from HRS Table 2-5 (Ref. 1, p. 51591).

Source Hazardous Waste Quantity Value: 8,400

SOURCE DESCRIPTION

2.2 Source Characterization

Source Number: 3

Source Description: CS-C through CS-E (contaminated soil)

Source 3 is the contaminated soil within Dead Creek segments CS-C through CS-E. Source 3 extends for 5,100 feet from Judith Lane on the north to SSI sample X110 on the south (see Figures 2 and 3). The width of Source 3 varies greatly but can be conservatively estimated to average 5 feet wide (Ref. 14; Ref. 24, pp. 17 and 18). Although it has been designated a perennial stream by the U.S. Geological Survey, this portion of Dead Creek is an intermittent stream in an area with mean annual precipitation greater than 20 inches as shown by photographs taken by IEPA (Ref. 8; Ref. 24, pp. 17 and 18; Ref. 64, p.4).

CS-C, CS-D, and CS-E flow through residential areas of Sauget and Cahokia (Ref. 8). Because of surface topography and the lack of adequate containment for the other Sauget Area 1 sources, CS-C, CS-D, and CS-E received hazardous substances through runoff from upstream Area 1 sources (Ref. 8; Ref. 18). Although culverts located at the southern ends of both Sources 1 and 2 had been blocked prior to the early 1960s, water has been observed flowing downstream past both these culverts (Ref. 11; Ref. 12; Ref. 13, p. 19; Ref. 16, pp. 1 and 2; Ref. 17, p. 1). Sampling of CS-C, CS-D, and CS-E was conducted by E&E in 1987 and by IEPA in 1991 (see Figure 3 for sample locations). These samples contained organic and inorganic compounds, as well as pesticides and PCBs (Ref. 4b, pp. 92 and 98; Ref. 15a, pp. 47, 51, 59, and 67).

Currently, the banks of CS-C through CS-E are well vegetated (Ref. 14, pp. 1-5 through 1-10). Several residences, and Parks College border Source 3 (Ref. 8). Access to Source 3 is not restricted (Ref. 14, p. 1-5 through 1-10).

Source Location:

Source 3 extends for 5,100 feet in Dead Creek segments CS-C through CS-E. The location of Source 3 is identified in Figure 2 and is visible in aerial photographs of the site (Ref. 18).

Containment:

The following subsections provide information about the pathway-specific containment values for Source 3.

Gas release to air

A gas release to air is possible because Source 3 (contaminated soil) does not have an impermeable, maintained cover and during periods of low precipitation has become completely dry. Furthermore, it is not surrounded by an engineered windbreak and does not contain a gas collection/treatment system or an uncontaminated soil cover (Ref. 24, pp. 17 and 18). Therefore, a containment value of 10 was assigned (Ref. 1, Table 6-3, p. 51652).

Particulate release to air

A particulate release to air is possible because Source 3 (contaminated soil) does not have an impermeable, maintained cover and during periods of low precipitation has become completely dry. Furthermore, it is not surrounded by an engineered windbreak and does not contain an uncontaminated soil cover (Ref. 24, pp. 17 and 18). Therefore, a containment value of 10 was assigned (Ref. 1, Table 6-9, p. 51653).

Release to ground water

The ground water migration pathway was not evaluated.

Release via overland migration or flood

Source 3 does not have a maintained engineered cover or maintained run-on control system and run-off management system (Ref. 14, pp. 1-5 through 1-9). Therefore, a containment value of 10 was assigned (Ref. 1, Table 4-2, p. 51609).

2.4.1 Hazardous Substances

The following list of hazardous substances present at Source 3 is based on the results of soil sampling conducted by E&E in 1987 and IEPA in 1991 (Ref. 3a and Ref. 4a). Samples showing the highest unqualified results for each substance detected are presented.

Sample designations beginning with an 'SD' refer to surface soil samples collected by E&E. Although the designation 'SD' typically refers to sediment samples, these samples were analyzed and regarded soil samples for HRS scoring because the portion of Dead Creek that is defined as Source 3 is an intermittent stream (Ref. 1, p. 51605; Ref. 24, pp. 17 and 18). Sample designations beginning with an 'X' refer to samples collected by IEPA. The numerical designation in parenthesis at the end of each sample indicates the depth in feet of sample collection. Sampling locations are presented in Figure 3 for both the E&E and the IEPA sampling events.

Hazardous Substance	Evidence	Reference
Acetone	X107 (0-1.5)	Ref. 4a, p. 3-7; Ref. 4b, p. 93
Aroclor 1248	SD-22 (2-2.5)	Ref. 3a, p. 3-11; Ref. 15a, p. 47
Aroclor 1254	SD-23 (0-0.5)	Ref. 3a, p. 3-11; Ref. 15a, p. 51
Aroclor 1260	SD-27 (0-0.5)	Ref. 3a, p. 3-11; Ref. 15a, p. 67
Arsenic	X107 (0-1.5)	Ref. 4a, p. 3-7; Ref. 4b, p. 155
Benzo(a)anthracene	SD-22 (2-2.5)	Ref. 3a, p. 3-11; Ref. 15a, p. 46
Benzo(a)pyrene	SD-22 (2-2.5)	Ref. 3a, p. 3-11; Ref. 15a, p. 46
Benzo(b)fluoranthene	SD-22 (2-2.5)	Ref. 3a, p. 3-11; Ref. 15a, p. 46
Benzo(g,h,i)perylene	SD-22 (2-2.5)	Ref. 3a, p. 3-11; Ref. 15a, p. 46
Cadmium	SD-24 (2-2.5)	Ref. 3a, p. 3-11; Ref. 15b, p. 16
Chlorobenzene	X107 (0-1.5)	Ref. 4a, p. 3-7, Ref. 4b, p. 93
Chromium	SD-24 (2-2.5)	Ref. 3a, p. 3-11; Ref. 15b, p. 16
Chrysene	SD-22 (2-2.5)	Ref. 3a, p. 3-11; Ref. 15a, p. 46
Copper	X107 (0-1.5)	Ref. 4a, p. 3-7; Ref. 4b, p. 155
Indeno(1,2,3-cd)pyrene	SD-22 (2-2.5)	Ref. 3a, p. 3-11; Ref. 15a, p. 46
Iron	SD-24 (2-2.5)	Ref. 3a, p. 3-11; Ref. 15b, p. 16
Lead	X107 (0-1.5)	Ref. 4a, p. 3-7; Ref. 4b, p. 155

2.4.1 Hazardous Substances (Continued)

Hazardous Substance	Evidence	Reference
Mercury	SD-24 (2-2.5)	Ref. 3a, p. 3-11; Ref. 15b, p. 16
Nickel	X107 (0-1.5)	Ref. 4a, p. 3-7; Ref. 4b, p. 155
Pyrene	X107 (0-1.5)	Ref. 4a, p. 3-7; Ref. 4b, p. 96
Silver	X107 (0-1.5)	Ref. 4a, p. 3-7; Ref. 4b, p. 155
Zinc	SD-22 (2-2.5)	Ref. 3a, p. 3-11; Ref. 15b, p. 14

A study published by IEPA has established mean background levels for naturally occurring and ubiquitous metals in soil samples in the state of Illinois (Ref. 65). A comparison of the metal concentrations detected in Source 3 with these mean background levels shows that the source concentrations are several orders of magnitude greater than state soil levels (Ref. 65, Table 2).

2.4.2 Hazardous Waste Quantity

The HWQ for Source 3 is based on the area of contaminated soil at the source.

2.4.2.1.1 Hazardous Constituent Quantity

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 3.

Sum (pounds) (S): Unknown

Hazardous Constituent Quantity Value: NE

2.4.2.1.2 Hazardous Wastestream Quantity

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 3.

Sum (pounds) (W): Unknown
Hazardous Wastestream Quantity Value: NE

2.4.2.1.3 Volume

Sufficient information to determine the volume of Source 3 is not available. For this reason, the volume of Source 3 was not evaluated.

Dimension of source (yd^3 or gallons) (V): Unknown
Volume Assigned Value: NE

2.4.2.1.4 Area

Source 3 extends for a length of about 5,100 feet between Judith Lane and SSI sample X110. An American Map Corporation map measurer was used to measure the length of Source 3 from a topographical map of Cahokia, Illinois (Ref. 4a, p. 3-6; Ref. 8). The width of Source 3 varies greatly but can be conservatively estimated to be greater than zero (>0) (Ref. 14; Ref. 24, pp. 17 and 18). Therefore, the area and assigned area value of contaminated soil for Source 3 is unknown but >0 (Ref. 1, Table 2-5, p. 51591).

Area of source (A): Unknown but >0
Reference(s): 4a, p. 3-6; 8; 14; 24, pp. 17 and 18
Area Assigned Value: >0

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ was determined using the area of Source 3. The assigned value for the source was then determined from HRS Table 2-5 (Ref. 1, p. 51591).

Source Hazardous Waste Quantity Value: >0

SOURCE DESCRIPTION

2.2 Source Characterization

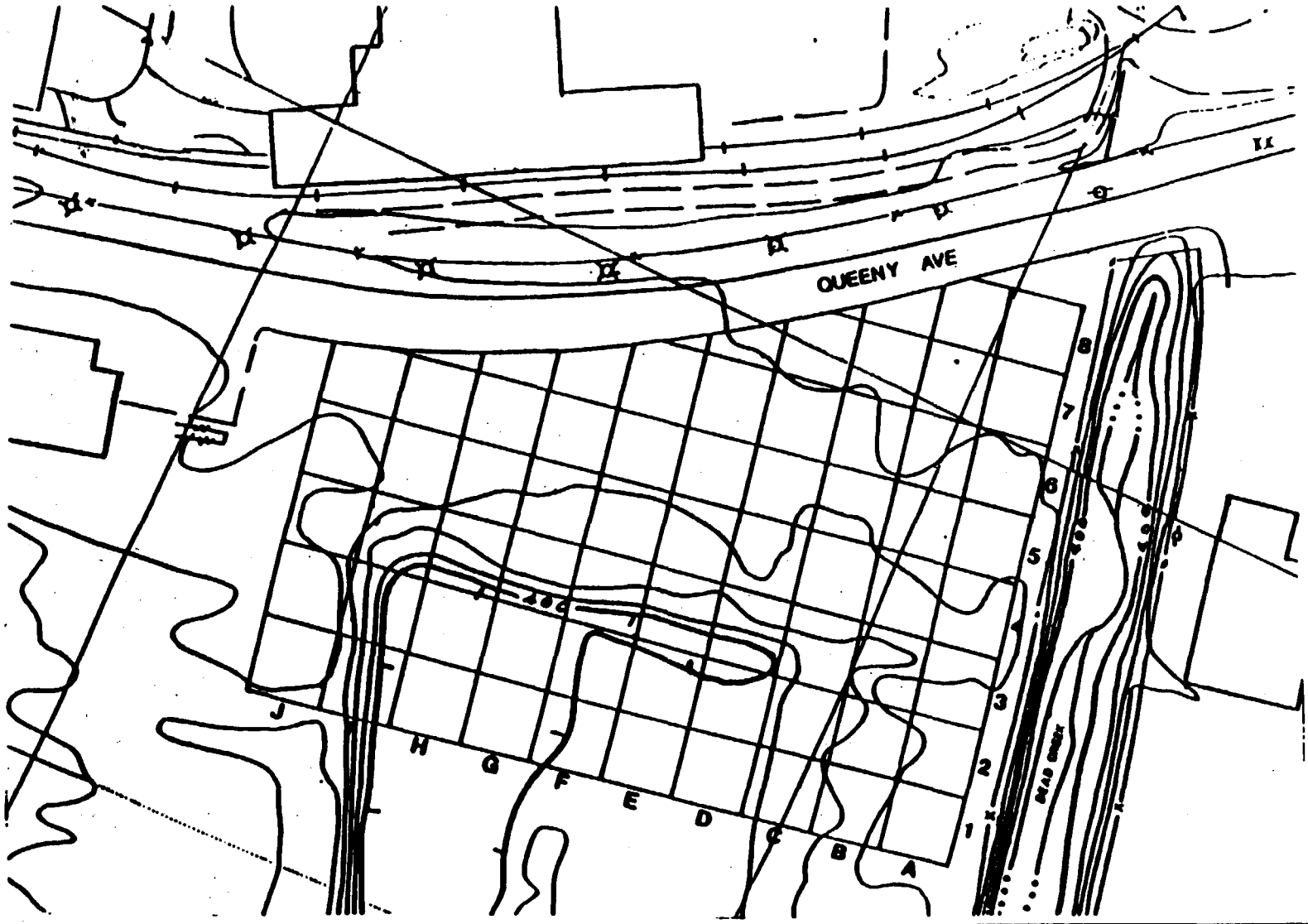
Source Number: 4

Source Description: G (landfill)

Source 4 is a former landfill occupying approximately 5.8 acres (see Figure 6). Fly ash and cinder material have been used as cover, but exposed demolition debris and metal wastes are present over most of Source 4. Two small pits filled with oily, tar-like wastes and corroded drums are located on the east portion of the landfill. Deteriorated drums are scattered or partially buried along the southern and western portions of Source 4 (Ref. 3a, p. 2-5). The landfill is well vegetated, but several areas of stressed vegetation are present (Ref. 14, p. 2).

Source 4 operated as a landfill from 1950 until 1973 (Ref. 3a, p. 2-67). Aerial photographs from 1955, 1962, and 1968 confirm that disposal activities were conducted during those years (Ref. 12; Ref. 32; Ref. 33). Much of the northern portion of Source 4, an area in which waste was identified in subsurface borings, was owned by Leo Sauget from July 1951 to May 1966 (Ref. 3a, pp. 3-22 and 3-32; Ref. 58, pp. 47 and 49). On November 25, 1969, an inspection of Source 4 by a St. Clair County sanitary inspector noted open dumping of chemicals, demolition materials, scrap lumber and metal, and paper (Ref. 56). Based on a 1974 aerial photograph, disposal activities appear to have been completed by that year (Ref. 34). Between 1950 to 1973, the property was owned by Cerro Copper, Wiese Engineering Company, and Emily and Myrtle Hankins (Ref. 3a, p. 2-67).

In 1986, E&E conducted surface and subsurface sampling at Source 4 (Ref. 3a, pp. 3-16 and 3-21) (see Figure 5 for E&E sampling grid at Source 4). Elevated levels of organic and inorganic substances were found (Ref. 3a, pp. 2-65 and 4-102). Highly elevated levels of PCBs were detected in both surface and subsurface soils (Ref. 15g, p. 54; Ref. 15c, pp. 82 and 86). A complete listing of hazardous substances found at Source 4 is presented in Section 2.4.1 of Source 4. In May 1987,



SAUGET AREA 1
SAUGET AND CAHOKIA, ILLINOIS

FIGURE 6
E & E GRID SECTOR
DESIGNATIONS AT SOURCE 4

ENVIRONMENTAL MANAGEMENT, INC.

SOURCE: MODIFIED FROM REF. 3a, p. 3-17

under the supervision of EPA, Monsanto constructed a chain-link fence around Source 4 to restrict access (Ref. 3a, p. 2-65).

Source Location:

Source 4 is located adjacent to the west bank of Source 2. Source 4 is bordered to the north by Queeny Avenue, to the west by Wiese Engineering Company, to the south by a cultivated field, and to the east by Source 2 (Ref. 3a, p. 2-5). Source 4 is identified in Figure 2 and is visible in aerial photographs of the site (Ref. 12; Ref. 32, Ref. 33; Ref. 34).

Containment:

The following subsections provide information about the pathway-specific containment values for Source 4.

Gas release to air

Hazardous substances have been detected in the surface soil of Source 4 (landfill) (Ref. 15g, p. 54). Although Source 4 is well vegetated, several areas of exposed soil are present (Ref. 3a, p. 2-5, Ref. 14, p. 2). Furthermore, it is not surrounded by an engineered windbreak and does not contain a gas collection/treatment system. Therefore, a containment value of 10 was assigned (Ref. 1, Table 6-3, p. 51652).

Particulate release to air

Hazardous substances have been detected in the surface soil of Source 4 (landfill) (Ref. 15g, p. 54). Although Source 4 is well vegetated, several areas of exposed soil are present (Ref. 3a, p. 2-5, Ref. 14, p. 2). Furthermore, it is not surrounded by an engineered windbreak. Therefore, a containment value of 10 was assigned (Ref. 1, Table 6-9, p. 51653).

Release to ground water

The ground water migration pathway was not evaluated.

Release via overland migration or flood

A release via overland migration or flood is possible because based on E&E's description of Source 4 there is no evidence that Source 4 has a maintained engineered cover or run-off management system (Ref. 3a, p. 2-5). Source 4 is at a higher elevation and slopes downward towards Source 2 (Ref. 3a,

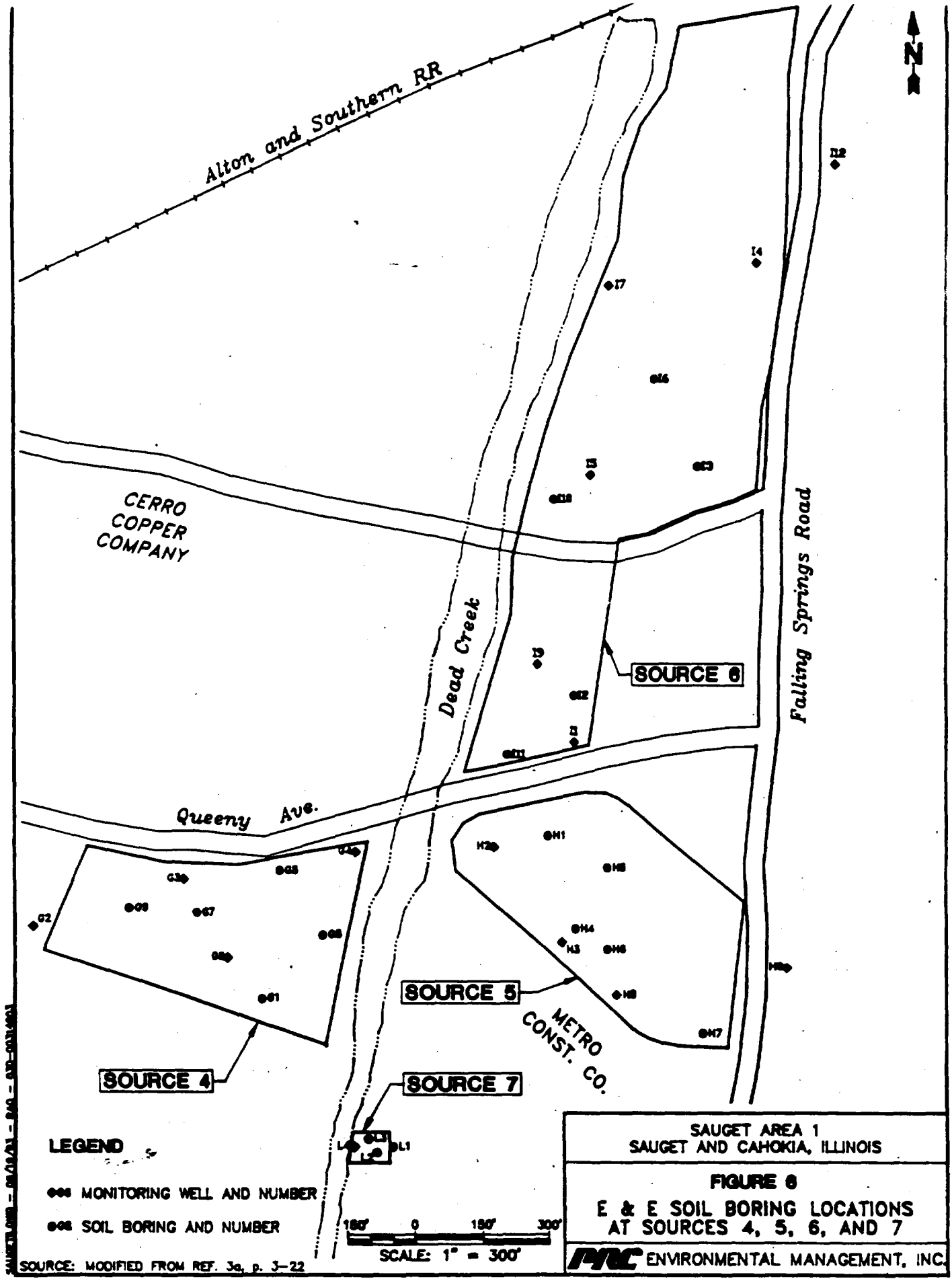
p. 3-17 and Ref. 5, Figure 1-2). As a result, contaminants may have migrated from Source 4 to Source 2. Therefore, a containment value of 10 was assigned (Ref. 1, Table 4-2, p. 51609).

2.4.1 Hazardous Substances

The following list of hazardous substances present at Source 4 is based on the results of soil sampling conducted by E&E in 1987 (Ref. 3a, pp. 3-18 and 3-32). Samples showing the highest unqualified results for each substance detected are presented.

Sample designations beginning with 'SS' refer to surface soil samples. Sample designations beginning with 'G' refer to subsurface soil samples. Sample designations with the suffix "RE" refer to samples that were reassayed by the laboratory. Surface soil samples were collected between 0 and 2 feet below the ground surface. The numerical designation in parenthesis at the end of each subsurface soil sample indicates the depth in feet of sample collection. The designation in parenthesis at the end of each surface soil sample indicates the grid sector, shown in Figure 5, from which the sample was collected. Sampling locations for subsurface soil samples are presented in Figure 6.

Hazardous Substance	Evidence	Reference
1,2,4-Trichlorobenzene	SS-34 (E5)	Ref. 3a, p. 3-18; Ref. 15e, p. 57
1,4-Dichlorobenzene	SS-21 (D4)	Ref. 3a, p. 3-18; Ref. 15g, p. 104
2-Hexanone	SS-20-RE (C4)	Ref. 3a, p. 3-18; Ref. 15g, p. 97
2-Nitroaniline	SS-37 (H5)	Ref. 3a, p. 3-18; Ref. 15e, p. 69
2,4-Dichlorophenol	G5-37 (5-15)	Ref. 3a, p. 3-32; Ref. 15k, p. 31
2,4,6-Trichlorophenol	G5-37 (5-15)	Ref. 3a, p. 3-32; Ref. 15k, p. 31
3,3'-Dichlorobenzidine	SS-16 (G3)	Ref. 3a, p. 3-18; Ref. 15g, p. 79
4-Methyl-2-pentanone	SS-20-RE (C4)	Ref. 3a, p. 3-18; Ref. 15g, p. 97
4-Nitrophenol	SS-40 (C6)	Ref. 3a, p. 3-18; Ref. 15e, p. 86
4,4'-DDE	SS-07 (I2)	Ref. 3a, p. 3-18; Ref. 15g, p. 38
	G6-67 (20-30)	Ref. 3a, p. 3-32; Ref. 15c, p. 70
Aluminum	SS-12 (D3)	Ref. 3a, p. 3-18; Ref. 15h, p. 16


Alton and Southern RR
CERRO COPPER COMPANY
Dead Creek
Falling Springs Road
Queeny Ave.
SOURCE 6
SOURCE 5
SOURCE 4
SOURCE 7
METRO CONST. CO.
N
LEGEND
MONITORING WELL AND NUMBER
SOIL BORING AND NUMBER
150' 0 150' 300'
SCALE: 1" = 300'
SOURCE: MODIFIED FROM REF. 3a, p. 3-22
SAUGET AREA 1
SAUGET AND CAHOKIA, ILLINOIS
FIGURE 8
E & E SOIL BORING LOCATIONS
AT SOURCES 4, 5, 6, AND 7
ENVIRONMENTAL MANAGEMENT, INC.

2.4.1 Hazardous Substances (Continued)

Hazardous Substance	Evidence	Reference
Anthracene	SS-43 (B7)	Ref. 3a, p. 3-18; Ref. 15e, p. 99
Antimony	SS-16 (G3)	Ref. 3a, p. 3-18; Ref. 15h, p. 20
Aroclor 1248	SS-11 (C3)	Ref. 3a, p. 3-18; Ref. 15g, p. 54
	G9-71 (35-40)	Ref. 3a, p. 3-32; Ref. 15c, p. 86
Aroclor 1254	SS-11 (C3)	Ref. 3a, p. 3-18; Ref. 15g, p. 54
Aroclor 1260	SS-11 (C3)	Ref. 3a, p. 3-18; Ref. 15g, p. 54
Benzene	G5-37 (5-15)	Ref. 3a, p. 3-32; Ref. 15k, p. 30
Benzo(a)anthracene	SS-43 (B7)	Ref. 3a, p. 3-18; Ref. 15e, p. 99
Benzo(a)pyrene	SS-43 (B7)	Ref. 3a, p. 3-18; Ref. 15e, p. 99
Benzo(b)fluoranthene	SS-16 (G3)	Ref. 3a, p. 3-18; Ref. 15g, p. 79
Benzo(g,h,i)perylene	SS-43 (B7)	Ref. 3a, p. 3-18; Ref. 15e, p. 99
Beryllium	SS-28 (J4)	Ref. 3a, p. 3-18; Ref. 15f, p. 9
Bis(2-ethylhexyl)phthalate	SS-11 (C3)	Ref. 3a, p. 3-18; Ref. 15g, p. 53
Cadmium	SS-15 (G3)	Ref. 3a, p. 3-18; Ref. 15h, p. 19
Chlorobenzene	G5-37 (5-15)	Ref. 3a, p. 3-32; Ref. 15k, p. 30
Chloroform	G9-71 (35-40)	Ref. 3a, p. 3-32; Ref. 15c, p. 84
Chromium	SS-15 (G3)	Ref. 3a, p. 3-18; Ref. 15h, p. 19
Chrysene	G5-37 (5-15)	Ref. 3a, p. 3-32; Ref. 15k, p. 31
Copper	SS-37 (H5)	Ref. 3a, p. 3-18; Ref. 15f, p. 18
Cyanide	SS-11 (C3)	Ref. 3a, p. 3-18; Ref. 15h, p. 15
Dibenzo(a,h)anthracene	SS-23 (F4)	Ref. 3a, p. 3-18; Ref. 15g. p. 115
Ethylbenzene	SS-38 (A6)	Ref. 3a, p. 3-18; Ref. 15e, p. 74
	G7-69 (10-25)	Ref. 3a, p. 3-32; Ref. 15c, p. 76
Fluoranthrene	SS-16 (G3)	Ref. 3a, p. 3-18; Ref. 15g, p. 79
Hexachlorobenzene	G2-31 (5-15)	Ref. 3a, p. 3-32; Ref. 15i, p. 74
Indeno(1,2,3-cd)pyrene	SS-43 (B7)	Ref. 3a, p. 3-18; Ref. 15e, p. 99
Iron	SS-16 (G3)	Ref. 3a, p. 3-18; Ref. 15h, p. 20
Mercury	SS-30 (B5)	Ref. 3a, p. 3-18; Ref. 15f, p. 11
N-Nitrosodiphenylamine[a]	G5-37 (5-15)	Ref. 3a, p. 3-32; Ref. 15k, p. 31
Naphthalene	SS-17 (H3)	Ref. 3a, p. 3-18; Ref. 15g, p. 83
	G8-70 (10-20)	Ref. 3a, p. 3-32; Ref. 15c, p. 81

2.4.1 Hazardous Substances (Continued)

Hazardous Substance	Evidence	Reference
Nickel	SS-12 (D3)	Ref. 3a, p. 3-18; Ref. 15h, p. 16
Pentachlorophenol	SS-39 (B6)	Ref. 3a, p. 3-18; Ref. 15e, p. 79
Phenanthrene	G5-37 (5-15)	Ref. 3a, p. 3-32; Ref. 15k, p. 31
Phenol	G5-37 (5-15)	Ref. 3a, p. 3-32; Ref. 15k, p. 31
Pyrene	SS-15 (G3)	Ref. 3a, p. 3-18; Ref. 15g, p. 74
Silver	SS-23 (F4)	Ref. 3a, p. 3-18; Ref. 15h, p. 27
Tetrachloroethene	G5-37 (5-15)	Ref. 3a, p. 3-32; Ref. 15k, p. 30
	SS-11 (C3)	Ref. 3a, p. 3-18; Ref. 15g, p. 52
Tin	SS-28 (J4)	Ref. 3a, p. 3-18; Ref. 15f, p. 9
Toluene	SS-38 (A6)	Ref. 3a, p. 3-18; Ref. 15e, p. 74
	G6-67 (20-30)	Ref. 3a, p. 3-32; Ref. 15c, p. 68
Trichloroethene	G7-69 (10-25)	Ref. 3a, p. 3-32; Ref. 15c, p. 76
Xylene (total)	SS-38 (A6)	Ref. 3a, p. 3-18; Ref. 15e, p. 74
	G7-69 (10-25)	Ref. 3a, p. 3-32; Ref. 15c, p. 76
Zinc	SS-30 (B5)	Ref. 3a, p. 3-18; Ref. 15f, p. 11

Note:
[a] Cannot be separated from diphenylamine

2.4.2 Hazardous Waste Quantity

The HWQ for Source 4 is based on the source's area.

2.4.2.1.1 Hazardous Constituent Quantity

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 4.

Sum (pounds) (S): Unknown

Hazardous Constituent Quantity Value: NE

2.4.2.1.2 Hazardous Wastestream Quantity

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 4.

Sum (pounds) (W): Unknown

Hazardous Wastestream Quantity Value: NE

2.4.2.1.3 Volume

Sufficient information to determine the capacity of or the depth of wastes disposed of at Source 4 is not available. For this reason, the volume of Source 4 was not evaluated.

Dimension of source (yd^3 or gallons) (V): Unknown

Volume Assigned Value: NE

2.4.2.1.4 Area

Aerial photographs of the Sauget area were used to determine the boundaries of Source 4 that are presented in Figure 6 (Ref. 3a, p. 3-22; Ref. 11; Ref. 12; Ref. 32; Ref. 33; Ref. 34). The computer program used to generate Figure 6 was used to determine the area of Source 4 in square inches. The scale of 1 inch equals 300 feet shown on Figure 6 was then used to calculate the area in square feet as follows:

$$2.80\ in^2 \times 90{,}000\ ft^2/in^2 = 252{,}000\ ft^2$$

A waste quantity divisor of 3,400 for a landfill is used to calculate the area value as follows (Ref. 1, Table 2-5, p. 51591):

252,000/3,400 = 74.12

Area of source (ft^2) (A): 252,000
Reference(s): 3a, p. 3-22; 8; 11; 12; 32; 33; 34
Area Assigned Value: 74.12

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ was determined using the area of Source 4. The assigned value for the source was then determined from HRS Table 2-5 (Ref. 1, p. 51591).

Source Hazardous Waste Quantity Value: 74.12

Gas release to air

A gas release to air is possible because hazardous substances have been detected between 0 and 10 feet below ground surface (bgs) at Source 5 (Ref. 15i, p. 35). Source 5 is well vegetated but the resistance of the cover soil to gas migration is unknown (Ref. 3a, p. 2-5). Therefore, a containment value of 10 was assigned (Ref. 1, Table 6-3, p. 51652).

Particulate release to air

A particulate release to air is possible because hazardous substances have been detected between 0 and 10 feet bgs at Source 5 (Ref. 15i, p. 35). Source 5 is well vegetated but the resistance of the cover soil to gas migration is unknown (Ref. 3a, p. 2-5). Therefore, a containment value of 10 was assigned (Ref. 1, Table 6-9, p. 51653).

Release to ground water

The ground water migration pathway was not evaluated.

Release via overland migration or flood

A release via overland migration or flood is possible because Source 5 does not have a maintained engineered cover or run-off management system (Ref. 14, p. 1-2). Therefore, a containment value of 10 was assigned (Ref. 1, Table 4-2, p. 51609).

2.4.1 Hazardous Substances

The following list of hazardous substances present at Source 5 is based on the results of subsurface soil sampling conducted by E&E in 1987 (Ref. 3a, p. 3-32). Samples showing highest unqualified results for each substance detected are presented.

The numerical designation in parenthesis at the end of each sample indicates the depth in feet of sample collection. Sampling locations are presented in Figure 6.

Hazardous Substance	Evidence	Reference
1,2-Dichlorobenzene	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 14
1,2,4-Trichlorobenzene	H1-14 (15-25)	Ref. 3a, p. 3-32; Ref. 15m, p. 68
1,4-Dichlorobenzene	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 14
2-Methylnaphthalene	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 14
2,4-Dichlorophenol	H1-14 (15-25)	Ref. 3a, p. 3-32; Ref. 15m, p. 68
2,4,6-Trichlorophenol	H1-14 (15-25)	Ref. 3a, p. 3-32; Ref. 15m, p. 68
4-Nitroaniline	H4-19 (10-25)	Ref. 3a, p. 3-32; Ref. 15i, p. 26
4,4'-DDD	H5-21 (0-10)	Ref. 3a, p. 3-32; Ref. 15i, p. 35
4,4'-DDE	H8-24 (5-15)	Ref. 3a, p. 3-32; Ref. 15i, p. 47
4,4'-DDT	H5-21 (0-10)	Ref. 3a, p. 3-32; Ref. 15i, p. 35
Anthracene	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 14
Aroclor 1260	H4-19 (10-25)	Ref. 3a, p. 3-32; Ref. 15i, p. 27
Benzene	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 13
Benzo(a)anthracene	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 14
Benzo(a)pyrene	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 14
Benzo(b)fluoranthene	H5-21 (0-10)	Ref. 3a, p. 3-32; Ref. 15i, p. 34
Benzo(g,h,i)perylene	H8-24 (5-15)	Ref. 3a, p. 3-32; Ref. 15i, p. 46
Cadmium	H1-14 (15-25)	Ref. 3a, p. 3-32; Ref. 15n, p. 17
Chlorobenzene	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 13
Chloroform	H3-17 (10-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 17
Chromium	H1-14 (15-25)	Ref. 3a, p. 3-32; Ref. 15j, p. 12
Chrysene	H8-24 (5-15)	Ref. 3a, p. 3-32; Ref. 15i, p. 46
Copper	H1-14 (15-25)	Ref. 3a, p. 3-32; Ref. 15n, p. 17
Cyanide	H1-14 (15-25)	Ref. 3a, p. 3-32; Ref. 15n, p. 17
Dibenzofuran	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 14
Fluoranthene	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 14
Fluorene	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 14
Hexachlorobenzene	H1-15 (35-50)	Ref. 3a, p. 3-32; Ref. 15m, p. 72
Iron	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15j, p. 5
Lead	H4-19 (10-25)	Ref. 3a, p. 3-32; Ref. 15j, p. 8
Mercury	H4-19 (10-25)	Ref. 3a, p. 3-32; Ref. 15j, p. 8
Naphthalene	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 14
Nickel	H1-14 (15-25)	Ref. 3a, p. 3-32; Ref. 15n, p. 17
Phenanthrene	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 14
Thallium	H5-21 (0-10)	Ref. 3a, p. 3-32; Ref. 15j, p. 10

2.4.1 Hazardous Substances (Continued)

Hazardous Substance	Evidence	Reference
Tin	H1-14 (15-25)	Ref. 3a, p. 3-32; Ref. 15n, p. 17
Toluene	H2-16 (5-20)	Ref. 3a, p. 3-32; Ref. 15i, p. 13
Zinc	H1-14 (15-25)	Ref. 3a, p. 3-32; Ref. 15n, p. 17

2.4.2 Hazardous Waste Quantity

The HWQ for Source 5 is based on the source's area.

2.4.2.1.1 Hazardous Constituent Quantity

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 5.

Sum (pounds) (S): Unknown

Hazardous Constituent Quantity Value: NE

2.4.2.1.2 Hazardous Wastestream Quantity

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 5.

Sum (pounds) (W): Unknown

Hazardous Wastestream Quantity Value: NE

2.4.2.1.3 Volume

Sufficient information to determine the depth of wastes disposed of throughout the entire area of Source 5 is not available. For this reason, the volume of Source 5 was not evaluated.

Dimension of source (yd^3 or gallons) (V): Unknown
Volume Assigned Value: NE

2.4.2.1.4 Area

Aerial photographs of the Sauget area were used to determine the boundaries of Source 5 (Ref. 11; Ref. 12; Ref. 32; Ref. 33; Ref. 34). The computer program used to generate Figure 6 was used to determine the area of Source 5 in square inches. The scale of 1 inch equals 300 feet shown on Figure 6 was then used to calculate the area in square feet as follows:

$$3.48\ in^2 \times 90{,}000\ ft^2/in^2 = 313{,}200\ ft^2$$

A waste quantity divisor of 3,400 for a landfill is used to calculate the area value as follows (Ref. 1, Table 2-5, p. 51591):

$$313{,}200/3{,}400 = 92.12$$

Area of source (ft^2) (A): 313,200
Reference(s): 8; 11; 12; 32; 33; 34
Area Assigned Value: 92.12

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ was determined using the area of Source 5. The assigned value for the source was then determined from HRS Table 2-5 (Ref. 1, p. 51591).

Source Hazardous Waste Quantity Value: 92.12

SOURCE DESCRIPTION

2.2 Source Characterization

Source Number: 6

Source Description: I (landfill)

Source 6 is a former landfill that occupies approximately 19.2 acres on property owned by Cerro Copper (see Figure 6). The southern area of Source 6 was a sand and gravel pit prior to its filling. Eleven borings performed by IEPA in 1987 in the area of this source identified two disposal pits (Ref. 4a, p.4-5). Based on aerial photographs, these pits are located on portions of Sources 5 and 6. The pits are located on the southern portion of Source 6, beneath Queeny Avenue, and on the northwest portion of Source 5 (Ref. 11; Ref. 18). The two pits lay adjacent to each other with the smaller pit located adjacent to Source 2 (Ref. 18). The larger pit is located west of the smaller pit (Ref. 18). The pits connected Sources 5 and 6 until Queeny Avenue was built. Although the pits connected Sources 5 and 6, the sources have not been combined based on the historic delineation of these sources as separate landfills.

Both pits are at least 23 to 25 feet deep. The depth of fill material ranges from 3 to 13 feet. The wastes found below the fill consist of oily sand, clay, wood, cinders, rubber, and cardboard. A sludge-like material and staining of the alluvial deposits are present below the waste. The respective volume of the waste in the large and small pits is estimated at 200,000 yd^3 and 50,000 yd^3 (Ref. 4a, pp. 4-5 and 4-6). A 1950 aerial photograph shows several small pits located on the southern portion of Source 6 (Ref. 11). A 1955 aerial photograph shows another pit that also appears to be filled with water, located north of the current Queeny Avenue (Ref. 12).

A September 1937 aerial photograph shows no waste activity at Source 5 (Ref. 18). An aerial photograph from 1950 indicates disposal activities began at the southern portion of Source 6 prior to 1950 (Ref. 11). Subsequent aerial photographs show continuing activities until sometime between 1968 and 1980. These aerial photographs show disposal activities at various times throughout the

entire area of Source 6 (Ref. 7, p. 10; Ref. 12; Ref. 32; Ref. 33; Ref. 34). All or part of Lots 126 and 127 of the Third Subdivision of Commons of Cahokia (representing the majority of the southern half of Source 6) was owned by Paul or Leo Sauget from approximately 1930 to 1965 (Ref. 58, pp. 102 to 105).

In Notifications of Hazardous Waste Site dated 1981, Monsanto indicated that it disposed of general chemical wastes from its Krummrich plant in Sauget and its Queeny Plant in St. Louis in a landfill along Falling Springs Road until 1957 (Ref. 61, p. 1 and Ref. 62, p. 1). Sources 5 and 6 are the only known landfills located on Falling Springs Road. After 1957, Monsanto began disposing of process wastes in a landfill located along the Mississippi River. Many of the wastes and waste types, including chlorobenzene, chlorophenols, chloroanilines, phenol, and miscellaneous solvents, that Monsanto acknowledges were disposed of in its landfill along the river, have also been detected in Source 6 (Ref. 57, pp. 1 and 2; see also Section 2.4.1 for Source 6).

Sampling conducted by E&E in 1987 at Source 6 revealed elevated levels of organic and inorganic substances including 4,4'-DDD and 4,4'-DDT (Ref. 15k, pp. 76 and 80) (see Figure 6 for sample locations). In 1989, a drilling crew working at Source 6 augured through a buried drum. An unknown amount of vapor was emitted, and five workers were hospitalized subsequent to the incident. A soil sample collected from the boring 4 hours later was analyzed by Monsanto. Monsanto's laboratory could only determine that the sample contained "a heavy distillate with a high boiling point" (Ref. 19, p. 2; Ref. 20, p. 2). Monsanto returned the remainder of the sample to Cerro who sent it to Environmetrics for analysis (Ref. 19, p. 2; Ref. 20, p. 2). The results for sample JM/G09/22/89-1 revealed extensive volatile and semivolatile contamination (Ref. 52, pp. 1 and 2). On September 25, Cerro Copper reaugered the location at which the incident occurred and resampled. Analysis of this sample (DI02) confirmed the previous results (Ref. 53, pp. 4, 6, 8, 9, 11, and 14). A complete listing of hazardous substances found at Source 6 is presented in Section 2.4.1 of Source 6.

Currently, the surface of Source 6 is covered with rock, graded, and level (Ref. 3a, p. 2-7; Ref. 4a, p. 4-5). Cerro Copper uses Source 6 to park machinery (Ref. 3a, p. 2-7). Access to Source 6 is restricted by a chain-link fence surrounding the entire Cerro property (Ref. 3a, p. 2-7).

Source Location:

Source 6 is located adjacent to the east bank of Source 1. It is bordered on the north by the Alton & Southern Railroad, on the east by Falling Springs Road, and on the south by Queeny Avenue (Ref. 8). Source 6 is identified in Figure 2 and is visible in aerial photographs of the site (Ref. 7; Ref. 11; Ref. 12; Ref. 32; Ref. 33; Ref. 34).

Containment:

The following subsections provide information about the pathway-specific containment values for Source 6.

Gas release to air

A gas release to air has been documented (Ref. 9, p. 2; Ref. 20, p. 2). Therefore, a containment value of 10 was assigned (Ref. 1, Table 6-3, p. 51652).

Particulate release to air

A particulate release to air is possible because hazardous substances have been detected between 5 and 15 feet bgs at Source 6 (Ref. 15k, p. 42). Source 6 is covered with rock and almost entirely devoid of vegetation (Ref. 4a, p. 4-5; Ref. 14, p. 1-1 and 1-2). Therefore, a containment value of 7 was assigned (Ref. 1, Table 6-9, p. 51653).

Release to ground water

The ground water migration pathway was not evaluated.

Release via overland migration or flood

A release via overland migration or flood is possible because Source 6 does not have a maintained engineered cover or run-off management system (Ref. 14, pp. 1-1 and 1-2). Therefore, a containment value of 10 was assigned (Ref. 1, Table 4-2, p. 51609).

2.4.1 Hazardous Substances

The following list of hazardous substances present at Source 6 is based on the results of subsurface soil sampling conducted by E&E in 1987 and Cerro in 1989 (Ref. 3a, p. 3-32; Ref. 52, p. 1; Ref. 53, pp. 4, 8, 9, 11, and 14). Samples showing the highest unqualified results for each substance detected are presented.

Sample designations beginning with "I" refer to soil samples collected by E&E. Sample JM/G09/22/89-1 was collected by Cerro on September 20, 1989. Sample DI02 was collected by Cerro and split with IEPA on September 25, 1989. The depth of sample collection for samples JM/G09/22/89-1 and DI02 is unknown. The location of sample DI02, collected on September 25, is shown on Figure 12; sample JM/G09/22/90-1 was also collected at this location. The numerical designation in parenthesis at the end of each E&E sample indicates the depth in feet of sample collection. E&E sampling locations are presented in Figure 6.

Hazardous substance	Evidence	Reference
1,1-Dichloroethene	DI02	Ref. 53, p. 4
1,1,1-Trichloroethane	I3-40 (5-15)	Ref. 3a, p. 3-32; Ref. 15k, p. 42
1,2-Dichlorobenzene	DI02	Ref. 53, p. 11
1,2-Dichloroethene (total)	DI02	Ref. 53, p. 4
1,2,4-Trichlorobenzene	I2-39 (5-25)	Ref. 3a, p. 3-32; Ref. 15k, p. 39
1,3-Dichlorobenzene	I11-51 (6-20)	Ref. 3a, p. 3-32; Ref. 15k, p. 87
1,3-Dichlorobenzene	JM/G09/22/89-1	Ref. 52, p. 1
1,4-Dichlorobenzene	I11-51 (6-20)	Ref. 3a, p. 3-32; Ref. 15k, p. 87
2-Methylnaphthalene	I6-43 (10-25)	Ref. 3a, p. 3-32; Ref. 15k, p. 55
2,3,6-Trichloro-1,1-biphenyl	JM/G09/22/89-1	Ref. 52, p. 1
2,4-Dichlorophenol	DI02	Ref. 53, p. 8

Hazardous substance	Evidence	Reference
2,4,6-Trichloro-1,1-biphenyl	JM/G09/22/89-1	Ref. 52, p. 1
2,4,6-Trichlorophenol	DI02	Ref. 53, p. 8
2,6,10,15-Tetramethylheptadecane	JM/G09/22/89-1	Ref. 52, p. 1
3,3'-Dichlorobenzidine	DI02	Ref. 53, p. 9
4-Chloroaniline	DI02	Ref. 53, p. 8
4-Methyl-2-pentanone	I6-43 (10-25)	Ref. 3a, p. 3-32; Ref. 15k, p. 54
4,4'-DDD	I9-48 (6-20)	Ref. 3a, p. 3-32; Ref. 15k, p. 76
4,4'-DDT	I9-49 (23-30)	Ref. 3a, p. 3-32; Ref. 15k, p. 80
Aroclor 1242	DI02	Ref. 53, p. 14
Aroclor 1254	DI02	Ref. 53, p. 14
Aroclor 1260	DI02	Ref. 53, p. 14
Benzene	I5-41 (5-27.5)	Ref. 3a, p. 3-32; Ref. 15k, p. 46
Benzyl alcohol	JM/G09/22/89-1	Ref. 52, p. 1
bis(2-Ethylhexyl)phthalate	I6-43 (10-25)	Ref. 3a, p. 3-32; Ref. 15k, p. 55
Cadmium	I1-38 (0-10)	Ref. 3a, p. 3-32; Ref. 15l, p. 10
Chlorobenzene	I3-40 (5-15)	Ref. 3a, p. 3-32; Ref. 15k, p. 42
Chromium	I6-43 (10-25)	Ref. 3a, p. 3-32; Ref. 15l, p. 15
Copper	I1-38 (0-10)	Ref. 3a, p. 3-32; Ref. 15l, p. 10
Docosane	JM/G09/22/89-1	Ref. 52, p. 1
Ethylbenzene	I1-38 (0-10)	Ref. 3a, p. 3-32; Ref. 15k, p. 34
Hexachlorobenzene	I5-42 (28-37.5)	Ref. 3a, p. 3-32; Ref. 15k, p. 51
Lead	I3-40 (5-15)	Ref. 3a, p. 3-32; Ref. 15l, p. 12
Mercury	I9-48 (6-20)	Ref. 3a, p. 3-32; Ref. 15l, p. 20
Methylene chloride	DI02	Ref. 53, p. 4
Naphthalene	I9-48 (6-20)	Ref. 3a, p. 3-32; Ref. 15k, p. 75
Nickel	I5-41 (5-27.5)	Ref. 3a, p. 3-32; Ref. 15l, p. 13
Pentachlorophenol	I1-38 (0-10)	Ref. 3a, p. 3-32; Ref. 15k, p. 35
Pentatriacontane	JM/G09/22/89-1	Ref. 52, p. 1
Phenanthrene	I6-43 (10-25)	Ref. 3a, p. 3-32; Ref. 15k, p. 55
Phenol	DI02	Ref. 53, p. 8
Tetrachloroethene	I2-39 (5-25)	Ref. 3a, p. 3-32; Ref. 15k, p. 38
Tin	I9-48 (6-20)	Ref. 3a, p. 3-32; Ref. 15l, p. 20
Toluene	I9-48 (6-20)	Ref. 3a, p. 3-32; Ref. 15k, p. 74
Toxaphene	I6-43 (10-25)	Ref. 3a, p. 3-32; Ref. 15k, p. 56

2.4.1 Hazardous Substances (Continued)

Hazardous substance	Evidence	Reference
Trichloroethene	I5-41 (5-27.5)	Ref. 3a, p. 3-32; Ref. 15k, p. 46
Total xylenes	I1-38 (0-10)	Ref. 3a, p. 3-32; Ref. 15k, p. 34

2.4.2 Hazardous Waste Quantity

The HWQ for Source 6 is based on the source's area.

2.4.2.1.1 Hazardous Constituent Quantity

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 6.

Sum (pounds) (S): Unknown

Hazardous Constituent Quantity Value: NE

2.4.2.1.2 Hazardous Wastestream Quantity

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 6.

Sum (pounds) (W): Unknown

Hazardous Wastestream Quantity Value: NE

2.4.2.1.3 Volume

IEPA estimated the volume of waste in Source 6 to be 250,000 cubic yards in the SSI report (Ref. 4a, p. 4-6). However, sufficient information to determine how this volume was calculated was not provided. For this reason, the volume of Source 6 was not evaluated.

Dimension of source (yd^3 or gallons) (V): Unknown
Volume Assigned Value: NE

2.4.2.1.4 Area

Aerial photographs of the Sauget area were used to determine the boundaries of Source 6 (Ref. 7; Ref. 11; Ref. 12; Ref. 32; Ref. 33; Ref. 34). The computer program used to generate Figure 6 was used to determine the area of Source 6 in square inches. The scale of 1 inch equals 300 feet shown on Figure 6 was then used to calculate the area in square feet as follows:

$$9.27\ in^2 \times 90{,}000\ ft^2/in^2 = 834{,}300\ ft^2$$

A waste quantity divisor of 3,400 for a landfill is used to calculate the area value as follows (Ref. 1, Table 2-5, p. 51591):

$$834{,}300/3{,}400 = 245.38$$

Area of source (ft^2) (A): 834,300
Reference(s): 7; 8; 11; 12; 32; 33; 34
Area Assigned Value: 245.38

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ was determined using the area of Source 6. The assigned value for the source was then determined from HRS Table 2-5 (Ref. 1, p. 51591).

Source Hazardous Waste Quantity Value: 245.38

SOURCE DESCRIPTION

2.2 Source Characterization

Source Number: 7

Source Description: L (surface impoundment)

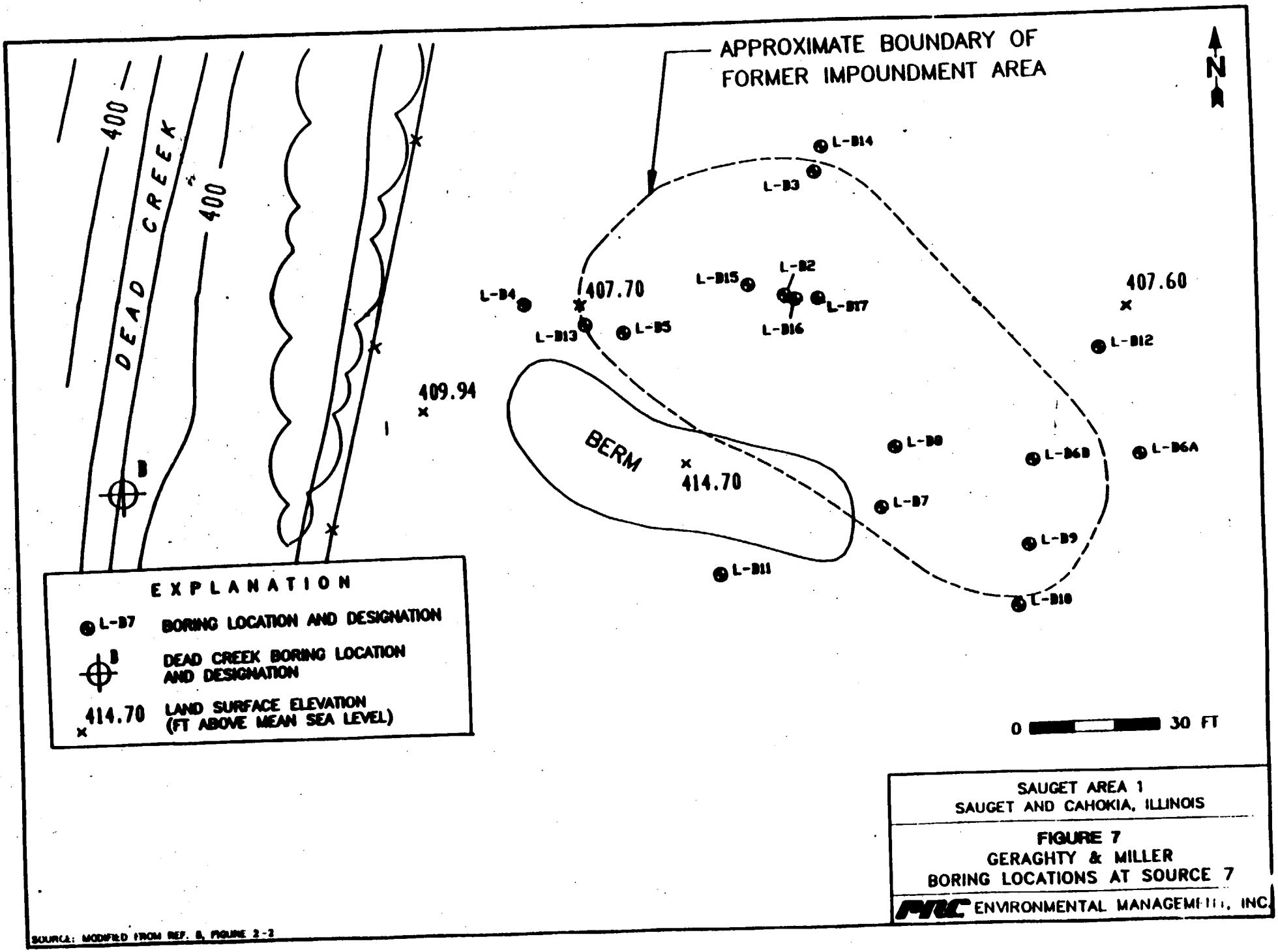
Source 7 is a backfilled surface impoundment that occupies about 7,600 square feet (Ref. 5, pp. 1-3 and 1-4; see Figure 6). In a letter dated August 6, 1971, IEPA directed Harold Waggoner & Co. to eliminate any discharges to Dead Creek after observing tanker trucks labeled as containing corrosive wastes apparently discharging their contents into Dead Creek on two occasions (Ref. 59, p. 1). As a result of this letter, Waggoner began using the area currently occupied by Source 7 in 1971 to dispose of wash water from hazardous waste tankers (Ref. 59, p. 1 and Ref. 60, p. 1). Ruan Trucking Company purchased the property in 1974 and continued to use Source 7 for the same purpose (Ref. 5, p. 1-4).

Disposal at Source 7 ceased in 1979 when Metro Construction Company purchased the property (Ref. 5, p. 1-4). The impoundment has been filled and is covered with cinders (Ref. 5, p. 1-4). Sampling conducted by E&E in 1987 for IEPA and Geraghty & Miller in 1991 for the Monsanto Company at Source 7 has revealed elevated levels of organic and inorganic compounds, including PCBs and heavy metals (Ref. 3a; Ref. 5, pp. D258, D259, and D260) (see Figures 6 and 7 for sampling locations). A complete listing of hazardous substances found at Source 7 is presented is Section 2.4.1 of Source 7.

Currently, the area is covered with black cinders and used to park heavy construction equipment (Ref. 3a, p. 2-7). Access to Source 7 is not restricted (Ref. 5, p. 1-3).

Source Location:

Source 7 is located on the east bank of Source 2 approximately 700 feet south of Queeny Avenue. Source 7 is identified in Figure 2 and is visible in aerial photographs of the site (Ref. 34).


APPROXIMATE BOUNDARY OF
FORMER IMPOUNDMENT AREA
N
DEAD CREEK
400
400
L-B14
L-B3
L-B2
L-B15
L-B4
407.70
L-B17
L-B13
L-B5
L-B16
407.60
L-B12
409.94
BERM
414.70
L-B8
L-B6B
L-B6A
L-B7
L-B9
L-B11
L-B10
B
EXPLANATION
L-B7 BORING LOCATION AND DESIGNATION
B DEAD CREEK BORING LOCATION AND DESIGNATION
414.70 LAND SURFACE ELEVATION (FT ABOVE MEAN SEA LEVEL)
0
30 FT
SAUGET AREA 1
SAUGET AND CAHOKIA, ILLINOIS
FIGURE 7
GERAGHTY & MILLER
BORING LOCATIONS AT SOURCE 7
ENVIRONMENTAL MANAGEMENT, INC.
SOURCE: MODIFIED FROM REF. 8, FIGURE 2-2

Containment:

The following subsections provide information about the pathway-specific containment values for Source 7.

Gas release to air

A gas release to air is possible because hazardous substances have been detected between 3 and 8 feet bgs at Source 7 (Ref. 5, p. D260). Source 7 is covered with black cinders (Ref. 3a, p. 2-7). Therefore, a containment value of 7 was assigned (Ref. 1, Table 6-3, p. 51652).

Particulate release to air

A particulate release to air is possible because hazardous substances have been detected between 3 and 8 feet bgs at Source 7 (Ref. 5, p. D260). Source 7 is covered with black cinders (Ref. 3a, p. 2-7). Therefore, a containment value of 7 was assigned (Ref. 1, Table 6-9, p. 51653).

Release to ground water

The ground water migration pathway was not evaluated.

Release via overland migration or flood

A release via overland migration or flood is possible because Source 7 does not have a maintained engineered cover or run-off management system. Source 7 is located at higher elevation than Source 2 and the land on the west side of Source 7 slopes downward toward Source 2 (Ref. 5, Figures 1-2 and 2-2). As a result, contaminants present in Source 7 may have migrated from Source 7 to Source 2. Therefore, a containment value of 10 was assigned (Ref. 1, Table 4-2, p. 51609).

2.4.1 Hazardous Substances

The following list of hazardous substances present at Source 7 is based on the results of subsurface soil sampling conducted by E&E in 1987 and Geraghty & Miller in 1991 (Ref. 3a, p. 3-33; Ref. 5, pp. D251, D255, D256, D259, D260, D262, D263, D264, and D265). Samples showing the highest unqualified results for each substance detected are presented below.

Sampling designations beginning with an "L" refer to samples collected by E&E. Sample designations beginning with a "GM" were collected be Geraghty & Miller. The numerical designation in parenthesis at the end of each sample indicates the depth in feet of sample collection. E&E sampling locations are presented in Figure 6. Geraghty & Miller sampling locations are presented in Figure 7. Sample GML1 (3-8) is a composite sample collected from borings L-B16 and L-B17 (Ref. 5, p. 2-4). Sample GML1 (8-14) is a composite sample collected from boring L-B17 (Ref. 5, p. 2-4). Sample GML2 was collected from boring L-B13 (Ref. 5, p. 2-4; Ref. 5, Figure 2-2).

Hazardous Substance	Evidence	Reference
1,2-Dichlorobenzene	GML1 (3-8)	Ref. 5, p. D264
1,2,4-Trichlorobenzene	GML1 (8-14)	Ref. 5, p. D264
1,3-Dichlorobenzene	GML1 (3-8)	Ref. 5, p. D264
1,4-Dichlorobenzene	GML2 (8-10)	Ref. 5, p. D255
2-Chlorophenol	L3-04 (5-15)	Ref, 3a, p. 3-33; Ref. 15m, p. 26
2,4-Dichlorophenol	GML2 (8-10)	Ref. 5, p. D255
4-Chloroaniline	GML1 (3-8)	Ref. 5, p. D264
4-Methyl-2-Pentanone	L4-09 (10-20)	Ref. 3a, p. 3-33; Ref. 15m, p. 47
4-Methylphenol	GML2 (8-10)	Ref. 5, p. D255
Anthracene	GML1 (3-8)	Ref. 5, p. D262
Antimony	L2-03 (5-15)	Ref. 3a, p. 3-33; Ref. 15n, p. 6
Aroclor 1260	GML1 (3-8)	Ref. 5, p. D260
Benzene	L3-04 (5-15)	Ref. 3a, p. 3-33; Ref. 15m, p. 25

2.4.1 Hazardous Substances (Continued)

Hazardous Substance	Evidence	Reference
Benzo(a)anthracene	GML1 (3-8)	Ref. 5, p. D262
Benzo(a)pyrene	GML1 (3-8)	Ref. 5, p. D262
Benzo(b)fluoranthene	GML1 (3-8)	Ref. 5, p. D262
Benzo(k)fluoranthene	GML1 (3-8)	Ref. 5, p. D262
Bis(2-Ethylhexyl)phthalate	L4-10 (10-20)	Ref. 3a, p. 3-33; Ref. 15m, p. 52
Butylbenzylphthalate	GML1 (3-8)	Ref. 5, p. D262
Cadmium	GML1 (3-8)	Ref. 5, p. D259
Calcium	GML1 (3-8)	Ref. 5, p. D259
Chlorobenzene	GML1 (3-8)	Ref. 5, p. D265
Chloroform	L3-04 (5-15)	Ref. 3a, p. 3-33; Ref. 15m, p. 25
Chrysene	GML1 (3-8)	Ref. 5, p. D262
Di-n-butylphthalate	L3-04 (5-15)	Ref. 3a, p. 3-33; Ref. 15m, p. 26
Fluoranthene	GML1 (3-8)	Ref. 5, p. D262
Fluorene	GML1 (3-8)	Ref. 5, p. D263
Hexachlorobenzene	GML1 (3-8)	Ref. 5, p. D262
Mercury	GML1 (3-8)	Ref. 5, p. D259
Naphthalene	GML1 (3-8)	Ref. 5, p. D264
Nickel	L3-04 (5-15)	Ref. 3a, p. 3-33; Ref. 15n, p. 7
Pentachlorophenol	L3-04 (5-15)	Ref. 3a, p. 3-33; Ref. 15m, p. 26
Phenanthrene	GML1 (3-8)	Ref. 5, p. D262
Phenol	GML2 (8-10)	Ref. 5, p. D255
Pyrene	GML1 (3-8)	Ref. 5, p. D262
Toluene	GML2 (8-10)	Ref. 5, p. D256
Xylene (total)	L2-03 (5-15)	Ref, 3a, p. 3-33; Ref. 15m, p. 21

2.4.2 Hazardous Waste Quantity

The HWQ for Source 7 is based on the source's area.

2.4.2.1.1 Hazardous Constituent Quantity

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 7.

Sum (pounds) (S): Unknown

Hazardous Constituent Quantity Value: NE

2.4.2.1.2 Hazardous Wastestream Quantity

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 7.

Sum (pounds) (W): Unknown

Hazardous Wastestream Quantity Value: NE

2.4.2.1.3 Volume

Sufficient information to determine the depth of Source 7 while it was used as an impoundment is not available. For this reason, the volume of Source 7 was not evaluated.

Dimension of source (yd^3 of gallons) (V): Unknown
Volume Assigned Value: NE

2.4.2.1.4 Area

Based on Geraghty & Miller's 1991 borings at Source 7, the dimensions of Source 7 are about 65 by 135 feet encompassing an area of approximately 7,600 ft^2 (Ref. 5, p. 1-3). A waste quantity divisor of 13 for impoundments is used to calculate the area value as follows (Ref. 1, Table 2-5, p. 51591):

$$7{,}600/13 = 584.62$$

Area of source (ft^2) (A): 7,600
Reference(s): 5, p. 1-3
Area Assigned Value: 584.62

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ was determined using the area of Source 7. The assigned value for the source was then determined from HRS Table 2-5 (Ref. 1, p. 51591).

Source Hazardous Waste Quantity Value: 584.62

SOURCE DESCRIPTION

2.2 Source Characterization

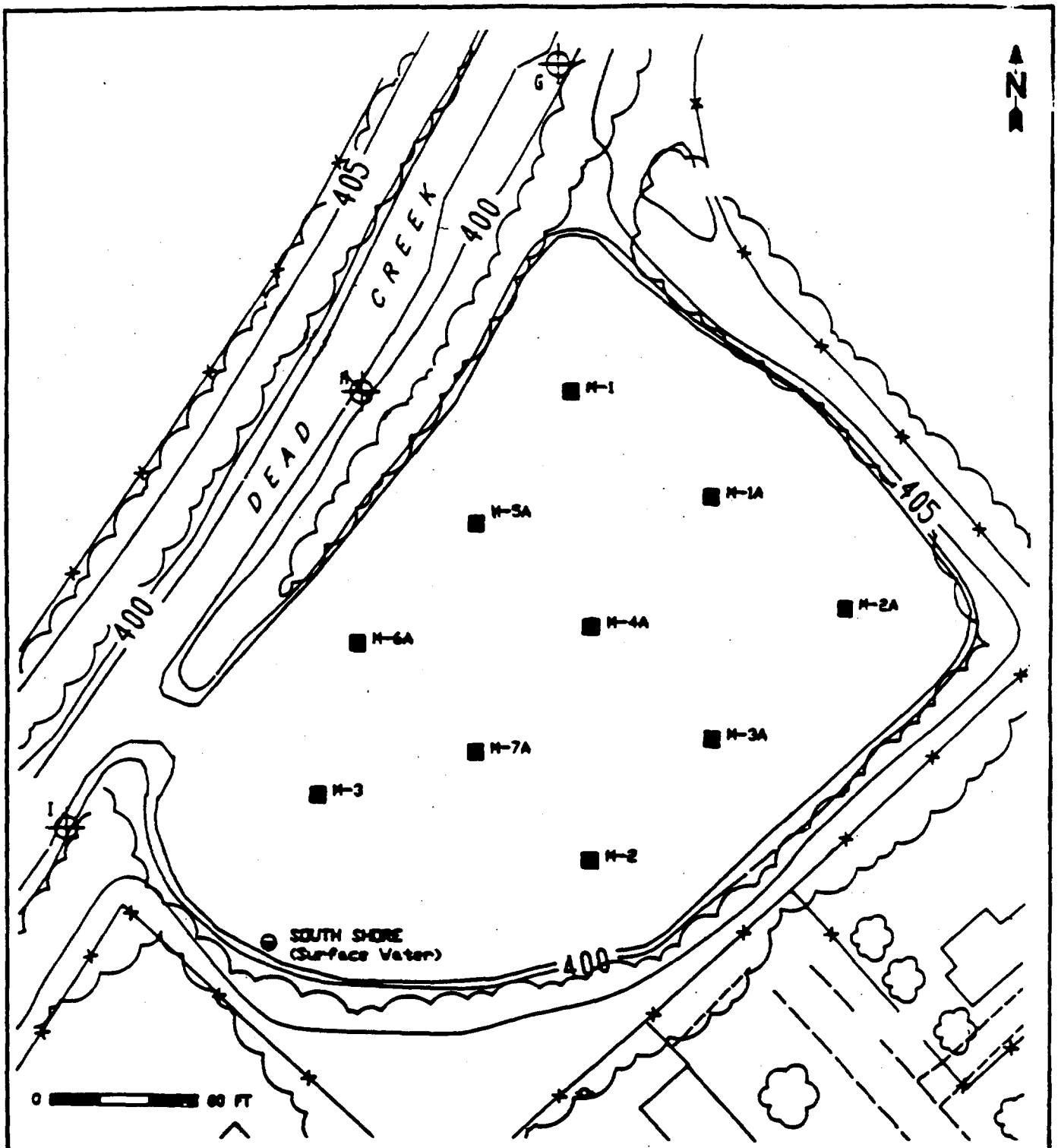
Source Number: 8

Source Description: M (surface impoundment)

Source 8 was a sand mining pit excavated by H.H. Hall Construction Company in the 1940s (Ref. 5, p. 1-4). A 1937 aerial photograph verifies that sand mining had not begun at Source 8 at that time (Ref. 18). Source 8 encompasses approximately 59,200 square feet (Ref. 5, p. 1-3). Based on aerial photographs, the pit has been filled with water and connected to Source 2 by a channel since prior to 1950 (Ref. 11). This channel allows water to flow between Sources 2 and 8 (Ref. 5, p. 1-3). It is also possible that suspended sediment from Source 2 flows through this channel and is deposited in Source 8 (Ref. 5, p. 3-4). Sediment thickness in Source 8 ranges from 0.5 to 5.5 feet (Ref. 5, p. 3-3). The greatest thickness is found at the southwest part of Source 8, nearest the channel (Ref. 5, p.3-4). Currently water in Source 8 is about 14 feet deep (Ref. 5, p. 1-3).

Sampling of Source 8 has revealed elevated levels of organic and inorganic substances including PCBs (Ref. 5, p. 4-4) (see Figure 8 for sampling locations). A study of Source 8 conducted by Geraghty & Miller for Monsanto in 1991 concluded approximately 3,600 cubic yards of Source 8 sediments are impacted by PCBs (Ref. 5, pp. 1-1 and 4-4). A complete listing of hazardous substances found at Source 8 is presented in Section 2.4.1 of Source 8.

Access to Source 8 is restricted by a chain-link fence (Ref. 3a, p. 2-14). In September 1980, IEPA constructed a snow fence surrounding Sources 2 and 8 because sampling of Source 2 showed elevated levels of phosphorous, heavy metals, and PCBs (Ref. 47). In October 1982, EPA replaced the snow fence with an 8-foot, chain-link fence surrounding Sources 2 and 8 (Ref. 3a, p. 2-61).



LEGEND

-400- ELEVATION (MEAN SEA LEVEL)

■ M-3 SEDIMENT SAMPLING/ANALYSIS LOCATION AND DESIGNATION

SURFACE-WATER SAMPLE LOCATION

I DEAD CREEK BORING PROFILE LOCATION AND DESIGNATION

SAUGET AREA 1
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FIGURE 8

GERAGHTY & MILLER SEDIMENT SAMPLE LOCATIONS AT SOURCE 8

SOURCE: MODIFIED FROM REF. 18, p. 5

ENVIRONMENTAL MANAGEMENT, INC.

Source Location:

Source 8 is located adjacent to the east bank of Source 2 approximately 200 feet north of Judith Lane. A residential area is located adjacent to the east boundary of Source 8 along Walnut Street (Ref. 8). Source 8 is identified in Figure 2 and is visible in aerial photographs of the site (Ref. 11; Ref. 26).

Containment:

The following subsections provide information about the pathway-specific containment values for Source 8.

Gas release to air

A gas release to air is possible because Source 8 does not have a gas collection or treatment system and is not covered by uncontaminated soil or vegetation (Ref. 5, p. 1-3). Therefore, a containment value of 10 was assigned (Ref. 1, Table 6-3, p. 51652).

Particulate release to air

A particulate release to air is not possible because Source 8 is covered by liquids (Ref. 5, p. 1-3). Therefore, a containment value of 0 was assigned (Ref. 1, Table 6-9, p. 51653).

Release to ground water

The ground water migration pathway was not evaluated.

Release via overland migration or flood

A release via overland migration or flood is possible because Source 5 does not have a maintained engineered cover or run-off management system (Ref. 5, p. 1-3). Therefore, a containment value of 10 was assigned (Ref. 1, Table 4-2, p. 51609).

2.4.1 Hazardous Substances

The following list of hazardous substances present at Source 8 is based on the results of sediment sampling conducted by Geraghty & Miller in 1991 (Ref. 5; specific page numbers are noted below). Samples showing the highest unqualified results for each substance detected are presented.

The numerical designation in parenthesis at the end of each sample indicates the depth in feet of sample collection. Sampling locations are presented in Figure 8.

Hazardous Substance	Evidence	Reference
1,2-Dichlorobenzene	M3 (0-8)	Ref. 5, p. D88
1,2,4-Trichlorobenzene	M3 (0-8)	Ref. 5, p. D88
1,4,-Dichlorobenzene	M-4A (0-1)	Ref. 5, pp. 2-6 and D235
Aroclor 1248	M-6A (0-1)	Ref. 5, pp. 2-6 and D238
Aroclor 1254	M-6A (0-1)	Ref. 5, pp. 2-6 and D238
Aroclor 1260	M-6A (0-1)	Ref. 5, pp. 2-6 and D238
Benzo(b)fluoranthene	M3 (0-8)	Ref. 5, p. D90
Cadmium	M3 (0-8)	Ref. 5, p. D84
Chlorobenzene	M3 (0-8)	Ref. 5, p. D87
Chromium	M3 (0-8)	Ref. 5, p. D92
Chrysene	M3 (0-8)	Ref. 5, p. D90
Copper	M3 (0-8)	Ref. 5, p. D92
Fluoranthene	M3 (0-8)	Ref. 5, p. D90
Iron	M3 (0-8)	Ref. 5, p. D92
Lead	M3 (0-8)	Ref. 5; p. D93
Nickel	M3 (0-8)	Ref. 5, p. D92
Pyrene	M-4A (0-1)	Ref. 5, pp. 2-6 and D233
Silver	M3 (0-8)	Ref. 5, p. D92
Zinc	M1 (0-3)	Ref. 5, p. D84

2.4.2 Hazardous Waste Quantity

The HWQ for Source 8 is based on the source's area.

2.4.2.1.1 Hazardous Constituent Quantity

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 8.

Sum (pounds) (S): Unknown
Hazardous Constituent Quantity Value: NE

2.4.2.1.2 Hazardous Wastestream Quantity

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 8.

Sum (pounds) (W): Unknown
Hazardous Wastestream Quantity Value: NE

2.4.2.1.3 Volume

Sufficient information is not available to determine the depth of Source 8 while it was used as an impoundment. For this reason, the volume of Source 8 was not evaluated.

Dimension of source (yd^3 or gallons) (V): Unknown
Volume Assigned Value: NE

2.4.2.1.4 Area

Based on an investigation by Geraghty & Miller in 1991, the dimensions of Source 8 are about 220 by 320 feet encompassing an area of approximately 59,200 ft^2 (Ref. 5, p. 1-3). A waste quantity divisor of 13 for a surface impoundment is used to calculate the area value as follows (Ref. 1, Table 2-5, p. 51591):

59,200/13 = 4,553.85

Area of source (ft^2) (A): 59,200
Reference(s): 5, p. 1-3
Area Assigned Value: 4,553.85

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ was determined using the area of Source 8. The assigned value for the source was then determined from HRS Table 2-5 (Ref. 1, p. 51591).

Source Hazardous Waste Quantity Value: 4,553.85

SOURCE DESCRIPTION

2.2 Source Characterization

Source Number: 9

Source Description: N (landfill)

Source 9 was a sand pit excavated by H.H. Hall Construction Company (Ref. 4a, p. 2-6). Aerial photographs show that Source 9 was excavated sometime between 1937 and 1950 (Ref. 11; Ref. 18). It encompasses an area of about 2.5 acres (Ref. 8; Ref. 18; Ref. 33).

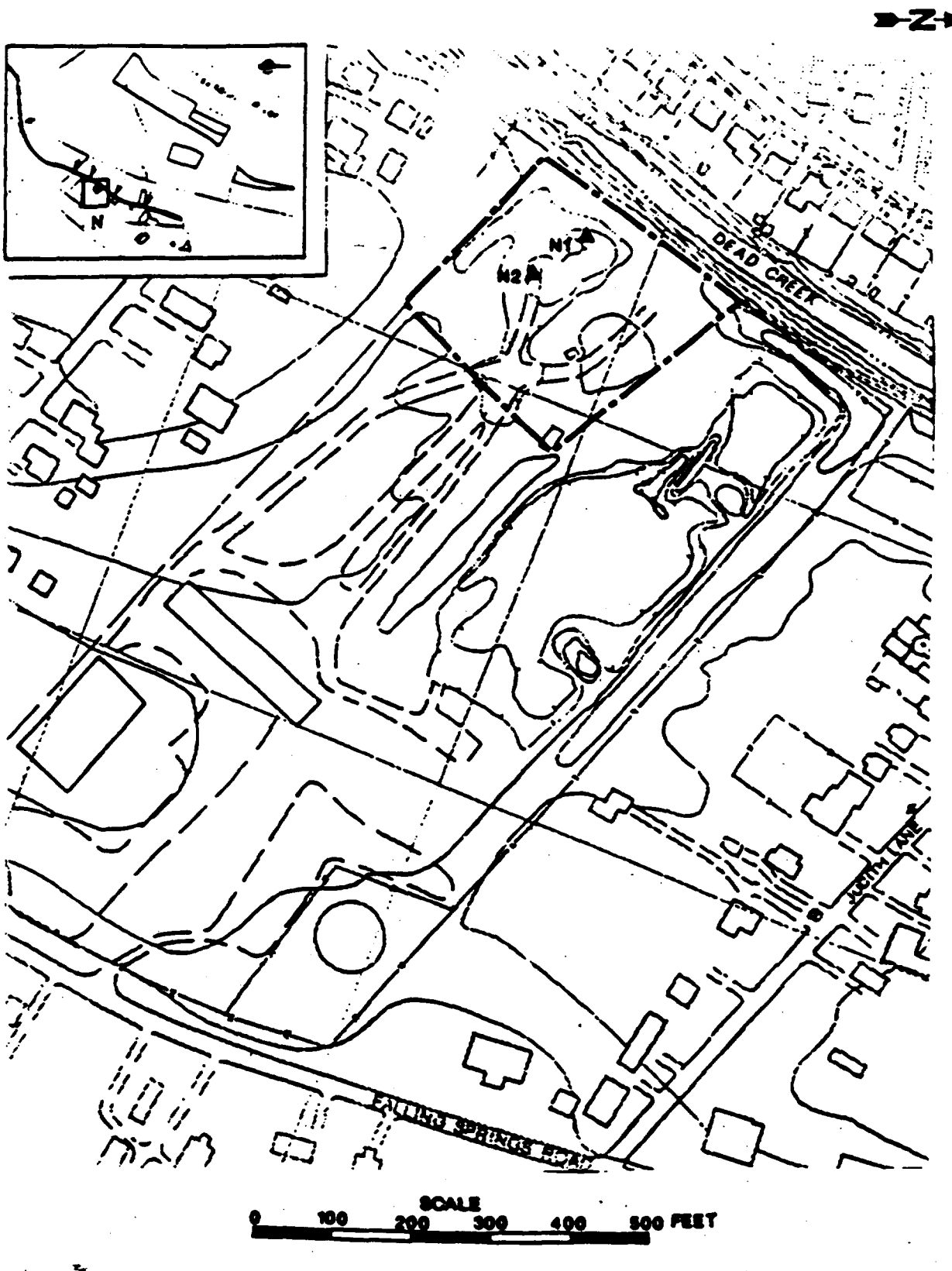
Source 9 has been partially filled in with construction debris, but the area remains below the surrounding topography (Ref. 3a, p. 2-14). Currently, Source 9 is covered with construction debris (Ref. 3a, p. 2-14). In 1987, sampling conducted by E&E during an ESI detected low levels of organic compounds (Ref. 15m, pp. 30 and 35) (see Figure 9 for sampling locations). A complete listing of hazardous substances found at Source 9 is presented in Section 2.4.1 of Source 9. Access to the site is restricted by a chain-link fence (Ref. 3a, p. 2-14).

Source Location:

Source 9 is located adjacent to the east bank of Source 3 approximately 700 feet south of Judith Lane on property formerly owned by the H.H. Hall Construction Company. Source 9 is identified in Figure 2 and is visible in aerial photographs of the site (Refs. 11 and 18).

Containment:

The following subsections provide information about the pathway-specific containment values for Source 9.



SOURCE: MODIFIED FROM REF. 19, p. 5

SAUGET AREA 1
SAUGET AND CAHOKIA, ILLINOIS

FIGURE 8
SUBSURFACE SAMPLE LOCATIONS AT SOURCE 9

ENVIRONMENTAL MANAGEMENT, INC.

Gas release to air

A gas release to air is possible because hazardous substances have been detected between 0 and 10 feet bgs at Source 9 (Ref. 15m, p. 30). Source 9 is covered with construction debris (Ref. 3a, p. 2-14). Therefore, a containment value of 10 was assigned (Ref. 1, Table 6-3, p. 51652).

Particulate release to air

A particulate release to air is possible because hazardous substances have been detected between 0 and 10 feet bgs at Source 9 (Ref. 15m, p. 30). Source 9 is covered with construction debris (Ref. 3a, p. 2-14). Therefore, a containment value of 10 was assigned (Ref. 1, Table 6-9, p. 51653).

Release to ground water

The ground water migration pathway was not evaluated.

Release via overland migration or flood

A release via overland migration or flood is possible because Source 9 does not have a maintained engineered cover or run-off management system. Therefore, a containment value of 10 was assigned (Ref. 1, Table 4-3, p. 51609).

2.4.1 Hazardous Substances

The following list of hazardous substances present at Source 9 is based on the results of subsurface soil sampling conducted by E&E in 1987 (Ref. 3a, p. 3-33). Samples showing the highest unqualified results for each substance detected are presented below. If no unqualified results were available for a hazardous substance, the sample with the highest qualified sample is shown. Specifically, for the PAHs, with the exception of fluoranthene, the results were qualified with a "J" to indicate that the hazardous substance was correctly identified but the concentrations were below the lowest calibration standard and were estimated based on extrapolation.

The numerical designation in parenthesis at the end of each sample indicates the depth in feet of sample collection. Sampling locations are presented in Figure 9.

Hazardous Substance	Evidence	Reference
bis(2-Ethylhexyl)phthalate	N2-06 (5-15)	Ref. 3a, p. 3-33; Ref. 15m, p. 35
Fluoranthene	N1-05 (0-10)	Ref. 3a, p. 3-33; Ref. 15m, p. 30

2.4.2 Hazardous Waste Quantity

The HWQ for Source 9 is based on the source's area.

2.4.2.1.1 Hazardous Constituent Quantity

Sufficient information is not available to evaluate the hazardous constituent quantity for Source 9.

Sum (pounds) (S): Unknown

Hazardous Constituent Quantity Value: NE

2.4.2.1.2 Hazardous Wastestream Quantity

Sufficient information is not available to evaluate the hazardous wastestream quantity for Source 9.

Sum (pounds) (W): Unknown

Hazardous Wastestream Quantity Value: NE

2.4.2.1.3 Volume

Sufficient information is not available to determine the depth of Source 9. For this reason, the volume of Source 9 was not evaluated.

Dimension of source (yd^3 or gallons) (V): Unknown
Volume Assigned Value: NE

2.4.2.1.4 Area

Aerial photographs of the Sauget area were used to determine the boundaries of Source 9 (Ref. 18; Ref. 33). Because the aerials did not have a scale, the USGS topographic map of Cahokia, Illinois, was used to determine an approximate scale (Ref. 8). Using this method, the area of Source 9 is approximately 2.5 acres. The area in square feet of Source 9 is calculated as follows:

$$2.5 \text{ acres} \times 43{,}560 \text{ ft}^2/\text{acre} = 108{,}900 \text{ ft}^2$$

A waste quantity divisor of 3,400 for a landfill is used to calculate the area value as follows (Ref. 1, Table 2-5 p. 51591):

$$108{,}900/3{,}400 = 32.03$$

Area of source (ft^2) (A): 108,900
Reference(s): 8; 18; 33
Area Assigned Value: 32.03

2.4.2.1.5 Source Hazardous Waste Quantity Value

The HWQ was determined using the area of Source 9. The assigned value for the source was then determined from HRS Table 2-5 (Ref. 1, p. 51591).

Source Hazardous Waste Quantity Value: 32.03

SITE SUMMARY OF SOURCE DESCRIPTIONS

Source No.	Source Description	Source Hazardous Waste Quantity Value	Containment			
			Ground Water	Surface Water	Gas	Air Particulate
1	CS-A	8,009.62	NE	9	7	7
2	CS-B	8,400	NE	10	10	10
3	CS-C through CS-E	>0	NE	10	10	10
4	G	74.12	NE	10	10	10
5	H	92.12	NE	10	10	10
6	I	245.38	NE	10	10	7
7	L	584.62	NE	10	7	7
8	M	4,553.85	NE	10	10	0
9	N	32.03	NE	10	10	10

4.1 OVERLAND/FLOOD MIGRATION COMPONENT

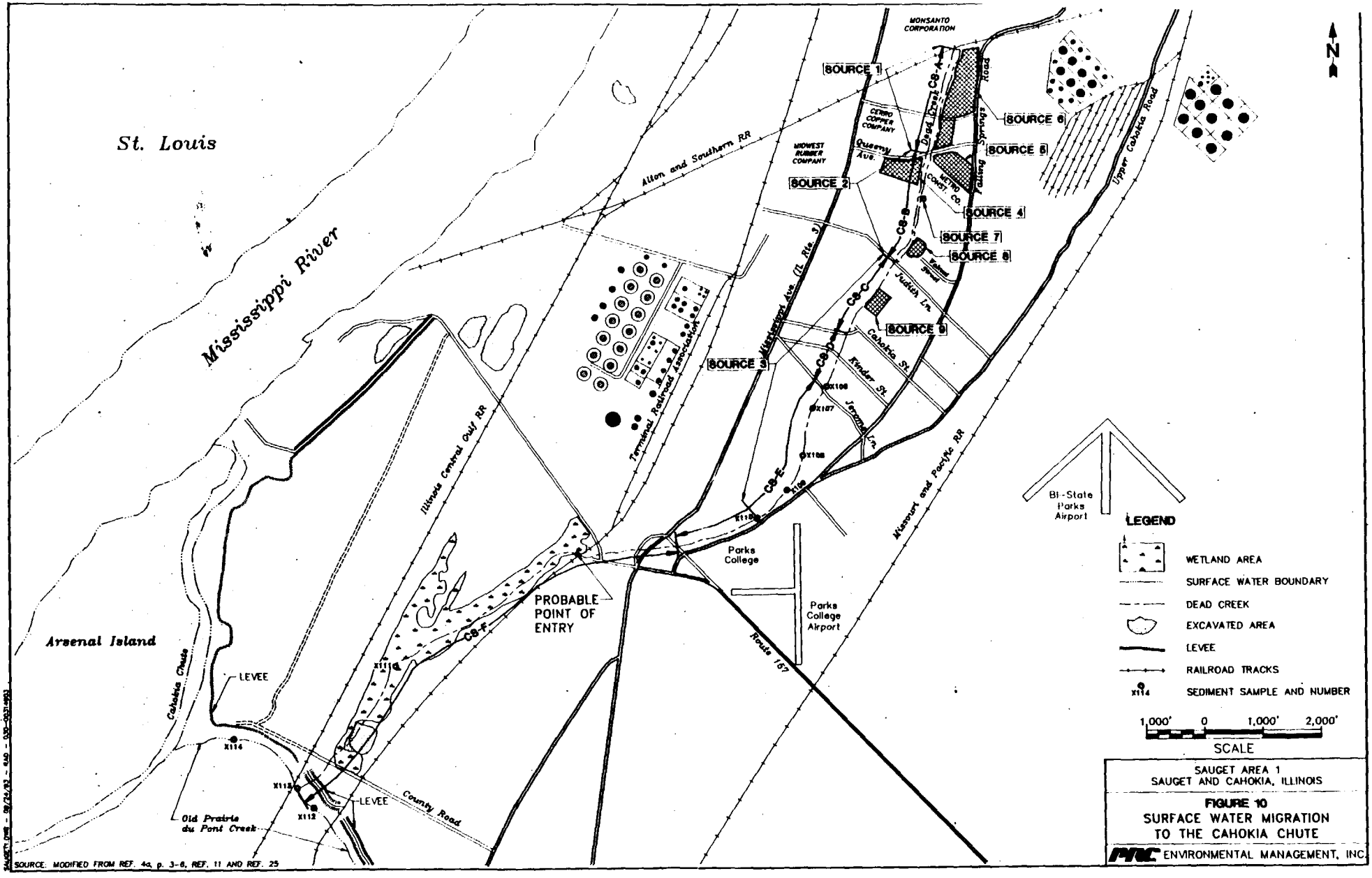
The Sauget Area 1 site is located in the Mississippi River watershed. One hazardous substance migration route exists from the site to surface water within the target distance limit (TDL) of 15 miles. This section describes the overland flow and flood migration component of the surface water migration pathway. This component includes three types of threats: drinking water threat; human food chain threat; and environmental threat.

4.1.1 Definition of Hazardous Substance Migration Path for Overland/Flood Component

The surface water migration pathway for the Sauget Area 1 site consists of runoff routes to Dead Creek, a wetland along Dead Creek, Old Prairie duPont Creek, the Cahokia Chute of the Mississippi River (Cahokia Chute), and the Mississippi River. The in-water segment begins at the wetland along Dead Creek in Creek segment CS-F. Figure 10 shows source locations along the surface water migration pathway to the Cahokia Chute. Figure 11 shows the surface water migration pathway to the end of the TDL. The overland and in-water segments of the pathway are discussed below.

The overland segment of the surface water migration pathway consists of runoff routes from the Sauget Area 1 sources to the probable point of entry (PPE) of hazardous substances to surface water. Because of surface topography and the proximity of the sources to Dead Creek, each of the sources drains into the creek directly or through Sources 1 or 2 (Ref. 8). Source 1 may flow northward towards a catch basin since it was regraded (Ref. 13, p. 19), but it formerly drained directly into Dead Creek through Source 2 (CS-B). Source 2 also drained directly into Dead Creek before the culvert at Judith Lane was blocked (Ref. 11; Ref. 12; Ref. 13, p. 19). Water is believed to flow downstream past the blocked culvert when it reaches an undetermined level in Source 2 (Ref. 13, p. 19).

Runoff from Sources 1 and 2 and sources adjacent to Dead Creek flowed southward through Source 3 (creek segments CS-C, CS-D, and CS-E), which have been observed without water and are considered intermittent (Ref. 24, pp. 17 and 18). The overland segment continues south of CS-E and terminates at the wetland in CS-F. The portion of Dead Creek between CS-E and the wetland is also



SOURCE: MODIFIED FROM REF. 4a, p. 3-6, REF. 11 AND REF. 25

SAUGET AREA 1
SAUGET AND CAHOKIA, ILLINOIS

FIGURE 10
SURFACE WATER MIGRATION TO THE CAHOKIA CHUTE

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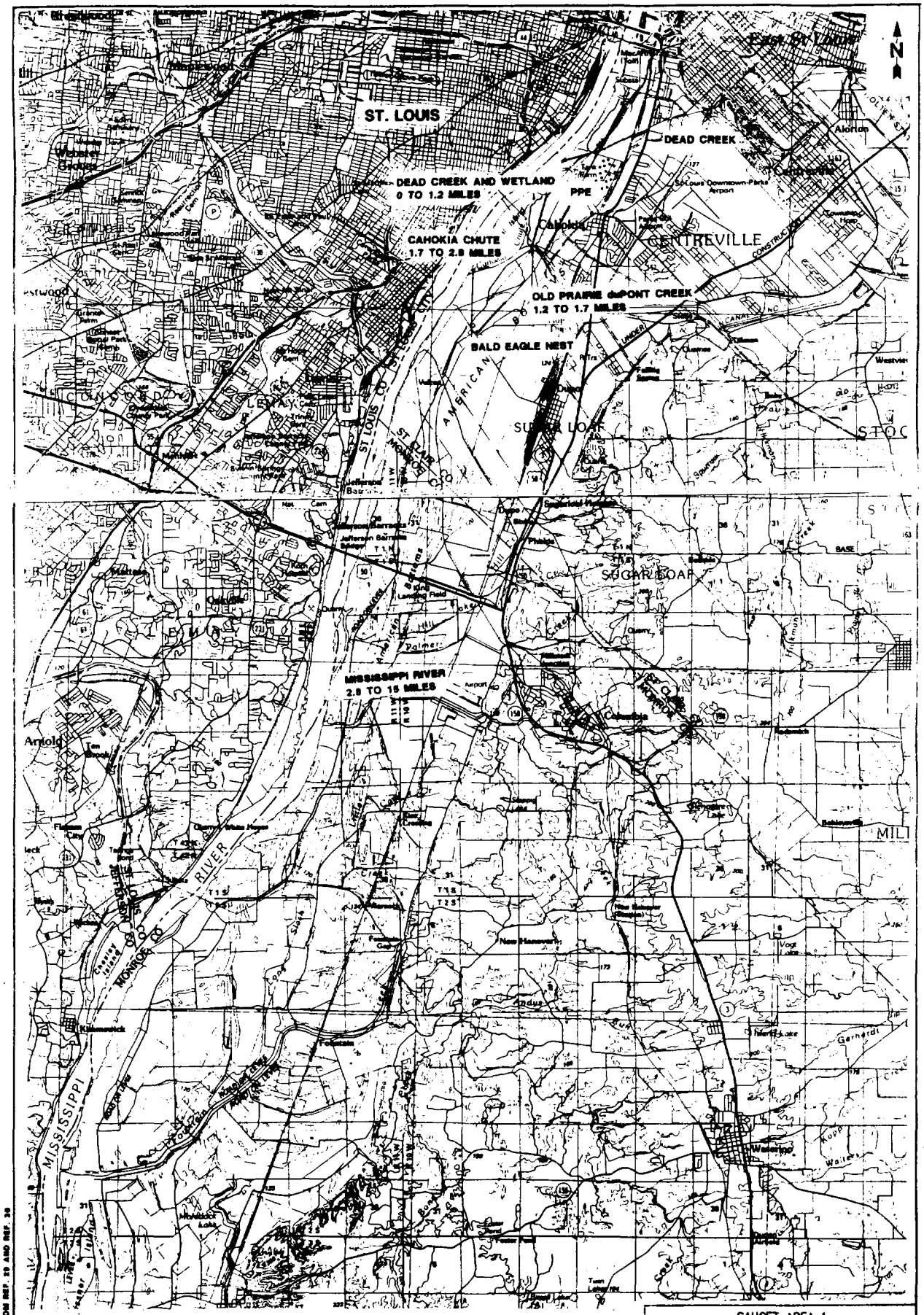


SCALE: 1:100,000

FEET 5000 0 10 000 20 000 30 000 40 000 50 000

MILES 1 0 1 2 3 4 5 6 7 8 9

SOURCE: MODIFIED FROM REF. 39 AND REF. 36

SAUGET AREA 1
SAUGET AND CAHOKIA, ILLINOIS

FIGURE 11

SURFACE WATER MIGRATION PATHWAY TO THE TARGET DISTANCE LIMIT

ENVIRONMENTAL MANAGEMENT, INC.

considered intermittent because it has been observed without water (Ref. 24, p. 19). Overland segments and distances to surface water for each of the Sauget Area 1 sources are summarized below.

Source	Description of Overland Segment	Length (feet)
1	Dead Creek (through Sources 2 and 3) from Queeny Avenue to PPE	9,140
2	Dead Creek (through Source 3) from Judith Lane to PPE	7,450
3	Dead Creek from southern end of Source 3 (sampling location X110) to PPE	3,050
4	Bank of CS-B (Source 2) and Dead Creek (through Sources 2 and 3) from southern limit of Source 4 to PPE	8,485
5	Land between Source 5 and Source 2 and Dead Creek (through Sources 2 and 3) from Queeny Avenue to PPE	9,140
6	Dead Creek (through Sources 1, 2, and 3) from Queeny Avenue to PPE	9,470
7	Dead Creek (through Sources 2 and 3) from southern limit of Source 7 to PPE	8,580
8	Dead Creek (through Sources 2 and 3) from southern limit of Source 8 to PPE	7,780
9	Dead Creek (through Source 3) from southern limit of Source 9 to PPE	6,610

The in-water segment of the surface water migration pathway begins at the PPE and consists of five segments. The PPE is the point where Dead Creek meets the wetland in creek segment CS-F. The wetland is marked on a U.S. Fish and Wildlife Service National Wetland Inventory (NWI) map (Ref. 25) and was delineated by the Illinois Department of Conservation (Ref. 24, p. 4). The five in-water segments were measured on U.S. Geological Survey topographic and the NWI map (Refs. 8 and 25) and are described below.

Segment	Description	Length (feet)	Mile/Feet Marker
1	Wetland and Dead Creek in CS-F from PPE to Country Road	5,800	1.1/5,800
2	Dead Creek from Country Road to confluence with Old Prairie duPont Creek	600	1.2/6,400
3	Confluence of Old Prairie duPont Creek and Dead Creek to Cahokia Chute	2,500	1.7/8,900
4	Cahokia Chute to the Mississippi River	5,700	2.8/14,600
5	Mississippi River	64,600	15/79,200

4.1.2 Drinking Water Threat

The drinking water threat of the surface water migration pathway is discussed below. The following subsections address the likelihood of release, waste characteristics, and drinking water targets.

4.1.2.1 Likelihood of Release

The likelihood of release factor category is based on an observed release factor, as presented in the following subsections.

4.1.2.1.1 Observed Release

Direct Observation

No observed release by direct observation has been identified in this documentation record for the surface water migration pathway.

Chemical Analysis

An observed release to surface water of hazardous substances, including Aroclor 1254, Aroclor 1260, cadmium, copper, lead, mercury, nickel, and zinc, has been established for the Sauget Area 1 site. The release is based on chemical analysis of a sediment sample collected from the wetland in CS-F. Sediment sample X111 collected in the wetland in CS-F contained the above-listed hazardous substances at concentrations significantly above background levels.

Background Concentration

The background concentrations of hazardous substances are based on sediment samples collected in Old Prairie duPont Creek, sample X112, and from the confluence of Dead Creek and Old Prairie duPont Creek, sample X113. Dead Creek originated where Source 1 (CS-A) is now located (Ref. 8). Because CS-A and CS-B, the next downstream segment of Dead Creek, were both used to dispose of hazardous substances and as a result, are sources, no upstream sampling locations exist in Dead Creek. As evidenced by Source 3 and downstream samples, the remainder of Dead Creek has been impacted by migration of hazardous substances from the sources. Therefore, no representative background sampling location exists in Dead Creek. During the 1991 SSI sampling event, a sediment sample (X112) was collected from the north bank of Old Prairie duPont Creek about 200 feet upstream of its confluence with Dead Creek to serve as background for the release sample (Ref. 4a, pp. 3-5 to 3-7). Because sample X112 was collected on the same day as the contaminated samples and at a similar depth, it is considered comparable to the sediment sample collected in Dead Creek.

Another sediment sample, X113, was collected from the confluence of Dead Creek and Old Prairie duPont Creek at the time of the 1991 SSI sampling event. This sample contains metals at concentrations comparable to sample X112, thereby accounting for local variability of the naturally occurring and ubiquitous metals. The table below summarizes the sampling information for these samples.

Sample ID	Sampling Location	Depth	Date	Reference
X112	North bank of Old Prairie duPont Creek, 200 feet upstream of confluence with Dead Creek	0 to 1.5 feet bgs, beneath 2 feet of water	03/28/91	Ref. 4a, pp. 3-4 to 3-7
X113	Center of Dead Creek at confluence of Old Prairie duPont Creek	0 to 2.5 feet bgs, beneath 1.5 feet of water	03/28/91	Ref. 4a, pp. 3-4 to 3-7

Release Sample

Sediment sample X111, collected during the 1991 SSI, demonstrates that an observed release to surface water has occurred as a result of hazardous substance migration from sources of contamination. Sample X111 was collected in the wetland in CS-F (Ref. 4a, pp. 3-5 to 3-7). Chemical analyses showed elevated concentrations of cadmium, copper, lead, mercury, nickel, zinc, and two PCBs; Aroclor 1254 and 1260 (Ref. 4b, pp. 122 and 159). Because these hazardous substances were either not detected in the background sediment samples or were detected in sample X111 at three times or greater than background levels, and because these hazardous substances are attributable to sources at the Sauget Area 1 site, they meet the observed release criteria. The tables below contain sampling information for the contaminated sample and summarize the analytical results for the background and release sediment samples.

Sample ID	Sampling Location	Depth	Date	Reference
X111	Center of Dead Creek in wetland adjacent to north power line pole base; 3,500 feet downstream of PPE	0 to 1.5 feet bgs, beneath 1 foot of water	03/28/91	Ref. 4a, pp. 3-4 to 3-7

Hazardous Substance	Sample X112 Background Sediment Sample			Sample X113 Background Sediment Sample		
	Concentration (mg/kg)	Sample Quantitation Limit (mg/kg)	Reference	Concentration (mg/kg)	Sample Quantitation Limit (mg/kg)	Reference
Aroclor 1254	ND[c]	0.426	Ref. 4b, p. 131; Ref. 39	ND	0.469	Ref. 4b, p. 137; Ref. 39
Aroclor 1260	ND	0.426	Ref. 4b, p. 131; Ref. 39	ND	0.469	Ref. 4b, p. 137; Ref. 39
Cadmium	ND	0.5	Ref. 4b, pp. 160; Ref. 39	ND	0.7	Ref. 4b, p. 161; Ref. 39
Copper	10.4	<10.4[b]	Ref. 4b, pp. 160; Ref. 39	13.2	<10.4[b]	Ref. 4b, p. 161; Ref. 39
Lead	7.7	<6.3[b]	Ref. 4b, pp. 160; Ref. 39	6.3	<6.3[b]	Ref. 4b, p. 161; Ref. 39
Mercury	ND	0.03	Ref. 4b, pp. 160; Ref. 39	ND	0.04	Ref. 4b, p. 161; Ref. 39
Nickel	14.0	<14.0[b]	Ref. 4b, pp. 160; Ref. 39	17.4	<14.0[b]	Ref. 4b, p. 161; Ref. 39
Zinc	44.7	<44.7[b]	Ref. 4b, pp. 160; Ref. 39	53.1	<44.7[b]	Ref. 4b, p. 161; Ref. 39

Note:

[b] Sample quantitation limits are not available for copper, lead, nickel, and zinc because these analytes were detected in all samples in the sample group. Therefore, the minimum quantitation limit was not recorded. The values presented above are the lowest concentrations detected, and the sample quantitation limits are assumed to be less than these values.

[c] ND = Not detected

Hazardous Substance	Sample X111 Release Sediment Sample		
	Concentration (mg/kg)	Sample Quantitation Limit (mg/kg)	Reference
Aroclor 1254	4.486	0.310	Ref. 4b, p. 122; Ref. 39
Aroclor 1260	0.862	0.310	Ref. 4b, p. 122; Ref. 39
Cadmium	23.5	0.7[a]	Ref. 4b, pp. 159 and 161; Ref. 39
Copper	'520	<10.4[b]	Ref. 4b, pp. 159 and 160; Ref. 39
Lead	83	<6.3[b]	Ref. 4b, pp. 159 and 161; Ref. 39
Mercury	0.34	0.04[a]	Ref. 4b, pp. 159 and 161; Ref. 39
Nickel	772	<14.0[b]	Ref. 4b, pp. 159 and 160; Ref. 39
Zinc	4,520	<44.7[b]	Ref. 4b, pp. 159 and 160; Ref. 39

[a] Sample quantitation limits are not available for sample X111 for cadmium, and mercury. The values presented are the highest not detected values in the sample group and the sample quantitation limits are assumed to be comparable to these values.

[b] Sample quantitation limits are not available for copper, lead, nickel, and zinc because these analytes were detected in all samples in the sample group. Therefore, the minimum quantitation limit was not recorded. The values presented above are the lowest concentrations detected, and the sample quantitation limits are assumed to be less than these values.

[c] ND = Not detected

Attribution

The hazardous substances detected in sediment sample X111 are attributable to the Sauget Area 1 site because all of these substances have been detected at higher concentrations in some or all of the sources and none of the sources were adequately contained to prevent surface water runoff into Dead Creek. Copper was detected in Source 2 (sample SD-19) at 15,300 mg/kg (Ref. 15b, p. 11); lead was detected in Source 4 (sample SS-23) at 11,700 mg/kg (Ref. 15h, p. 27); mercury was detected in Source 4 (sample SS-30) at 23 mg/kg (Ref. 15f, p. 11); and nickel was detected in Source 1 (sample A11D) at 6,940 mg/kg (Ref. 6, p. 85). Source 4 (sample SS-11) contained the highest concentrations of Aroclor 1254 (29,000 mg/kg) and Aroclor 1260 (21,000 mg/kg) (Ref. 15g, p. 54). Samples

SS-15, SS-13, and SS-30 collected from Source 4 contained the highest concentrations of cadmium (46 mg/kg); and zinc (67,800 mg/kg), respectively (Ref. 15f, p. 11; Ref. 15h, pp. 17 and 19).

In addition to being detected at highly elevated concentrations in the sources, the substances detected in surface water are attributable to the Sauget Area 1 site because they are present in generally decreasing concentrations from the sources at the upper reaches of the creek to the wetland adjacent to CS-F. For example, Aroclor 1254 was detected in Source 1 at 71 mg/kg in sample SD-35, Source 2 at 141 mg/kg in sample SD-19, CS-C at 11 mg/kg in sample SD-23, CS-D at 7.5 mg/kg in sample SD-27, and the wetland at 4.486 mg/kg in sample X111 (Ref. 15a, pp. 35, 51, 67, and 95; Ref. 4b, p. 122). Because Sources 4, 5, 6, 7, and 8 are adjacent to Sources 1 and 2 and were not adequately contained, the upper reaches of Dead Creek were likely to have received contaminated runoff from these sources. Sources 1 and 2 contain the highest concentrations of hazardous substances (see samples SD-19, SD-34, and SD-35), and lower portions of Dead Creek (Source 3) generally contain lower concentrations (see samples SD-22 through SD-27, X107, and X111) (Ref. 3a, pp. 3-11 and 3-12; Ref. 15a, pp. 35, 67, and 95; Ref. 15b, pp. 6, 11, 14 to 18, 25, and 26; Ref. 4a, p. 3-6; Ref. 4b, pp. 98, 122, 155, and 159). This pattern reflects that runoff from the sources drained down the creek to the wetland adjacent to CS-F.

Hazardous Substances Released:

The following hazardous substances have been released to surface water from the Sauget Area 1 sources: Aroclor 1254, Aroclor 1260, cadmium, copper, lead, mercury, nickel, and zinc.

Observed Release Factor Value: 550

4.1.2.2 Waste Characteristics

The following subsections describe the evaluation of the waste characteristics factor category value of the drinking water threat.

4.1.2.2.1 Toxicity/Persistence

The table below shows the toxicity and persistence factor values for the hazardous substances in sources having non-zero containment factor values for the surface water migration pathway. All of the substances listed below were detected in sediment and soil samples collected from the sources and are or were available to migrate to surface water. The individual toxicity and persistence factor values were obtained from Appendix B-1 of the EPA Superfund Chemical Data Matrix (SCDM) (Ref. 2), and the combined toxicity and persistence factor values were obtained from Table 4-12 of the HRS final rule (Ref. 1, p. 51613). Those substances for which no toxicity factor value is presented in SCDM have been omitted from the table below.

Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value	Toxicity/Persistence Factor Value	Reference
Acetone	3	10	0.0007	0.007	Ref. 2, p. B-1
Anthracene	4, 5, 6, and 7	10	0.4	4	Ref. 2, p. B-2
Antimony	1, 4, and 7	10,000	1	10,000	Ref. 2, p. B-2
Aroclor 1221*	1	10,000	1	10,000	Ref. 2, p. B-13
Aroclor 1232*	1	10,000	1	10,000	Ref. 2, p. B-13
Aroclor 1242*	6	10,000	1	10,000	Ref. 2, p. B-13
Aroclor 1248*	1, 3, 4, and 8	10,000	1	10,000	Ref. 2, p. B-13
Aroclor 1254*	1, 2, 3, 4, 6, and 8	10,000	1	10,000	Ref. 2, p. B-13
Aroclor 1260*	1, 2, 3, 4, 5, 6, 7, and 8	10,000	1	10,000	Ref. 2, p. B-13
Arsenic	1 and 3	10,000	1	10,000	Ref. 2, p. B-2
Benzene	4, 5, 6, and 7	100	0.4	40	Ref. 2, p. B-2
Benzo(a)anthracene	3, 4, 5, and 7	1,000	1	1,000	Ref. 2, p. B-2

4.1.2.2.1 Toxicity/Persistence (continued)

Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value	Toxicity/Persistence Factor Value	Reference
Benzo(a)pyrene	3, 4, 5, and 7	10,000	1	10,000	Ref. 2, p. B-2
Beryllium	1 and 4	10,000	1	10,000	Ref. 2, p. B-3
Bis(2-ethylhexyl)-phthalate	1, 2, 4, 6, 7, and 9	100	1	100	Ref. 2, p. B-3
Butylbenzylphthalate	7	10	1	10	Ref. 2, p. B-3
Cadmium	1, 2, 3, 4, 5, 6, 7, and 8	10,000	1	10,000	Ref. 2, p. B-4
4-Chloroaniline	1, 6, and 7	1,000	0.07	70	Ref. 2, p. B-4
Chlorobenzene	1, 3, 4, 5, 6, 7, and 8	100	0.0007	0.07	Ref. 2, p. B-4
Chloroform	4, 5, and 7	100	0.4	40	Ref. 2, p. B-5
2-Chlorophenol	7	100	0.4	40	Ref. 2, p. B-5
Chromium	1, 2, 3, 4, 5, 6, and 8	10,000	1	10,000	Ref. 2, p. B-5
Cyanide	4 and 5	100	0.4	40	Ref. 2, p. B-5
4,4'-DDD	5 and 6	100	1	100	Ref. 2, p. B-6
4,4'-DDE	4 and 5	100	1	100	Ref. 2, p. B-6
4,4'-DDT	5 and 6	1,000	1	1,000	Ref. 2, p. B-6
Dibenzo(a,h)anthracene	4	No value	1	No value	Ref. 2, p. B-6
1,2-Dichlorobenzene	1, 5, 6, 7, and 8	10	0.4	4	Ref. 2, p. B-6
1,4-Dichlorobenzene	1, 2, 4, 5, 6, 7, and 8	10	0.4	4	Ref. 2, p. B-6
3,3'-Dichlorobenzidine	4 and 6	100	1	100	Ref. 2, p. B-7
Dichlorodifluoro-methane	1	10	0.4	4	Ref. 2, p. B-7
1,1-Dichloroethane	1	10	0.4	4	Ref. 2, p. B-7
1,1-Dichloroethene	6	100	0.4	40	Ref. 2, p. B-7
1,2-Dichloroethene (total)	1 and 6	100	0.4	40	Ref. 2, p. B-7
2,4-Dichlorophenol	4, 5, 6, and 7	1,000	1	1,000	Ref. 2, p. B-7
Di-n-butylphthalate	7	10	1	10	Ref. 2, p. B-6
Di-n-octylphthalate	1	100	1	100	Ref. 2, p. B-6
Ethylbenzene	1, 2, 4, and 6	10	0.4	4	Ref. 2, p. B-9
Fluorene	5 and 7	100	1	100	Ref. 2, p. B-9
Hexachlorobenzene	5 and 7	1,000	1	1,000	Ref. 2, p. B-10
Lead	1, 2, 3, 5, 6, and 8	10,000	1	10,000	Ref. 2, p. B-11
Mercury	1, 2, 3, 4, 5, 6, and 7	10,000	1	10,000	Ref. 2, p. B-11
Methylene chloride	6	10	0.4	4	Ref. 2, p. B-12

4.1.2.2.1 Toxicity/Persistence (continued)

Hazardous Substance	Source No.	Toxicity Factor Value	Persistence Factor Value	Toxicity/Persistence Factor Value	Reference
Naphthalene	4, 5, 6, and 7	1	0.4	0.4	Ref. 2, p. B-12
Nickel	1, 3, 4, 5, 6, 7, and 8	100	1	100	Ref. 2, p. B-12
2-Nitroaniline	4	1	0.4	0.4	Ref. 2, p. B-12
4-Nitroaniline	5	1	0.4	0.4	Ref. 2, p. B-12
4-Nitrophenol	4	1	1	1	Ref. 2, p. B-13
N-Nitrosodiphenyl-amine	4	10	1	10	Ref. 2, p. B-13
Pentachlorobenzene	1	1,000	1	1,000	Ref. 2, p. B-13
Pentachlorophenol	4, 6, and 7	100	1	100	Ref. 2, p. B-14
Phenol	4, 6, and 7	1	1	1	Ref. 2, p. B-14
Pyrene	3, 4, 7, and 8	100	1	100	Ref. 2, p. B-15
Silver	1, 2, 3, 4, and 8	100	1	100	Ref. 2, p. B-15
1,2,4,5-Tetrachlorobenzene	1	10,000	1	10,000	Ref. 2, p. B-15
Tetrachloroethene	4 and 6	100	0.4	40	Ref. 2, p. B-16
Thallium	2 and 5	1,000	1	1,000	Ref. 2, p. B-16
Toluene	2, 4, 5, 6, and 7	10	0.4	4	Ref. 2, p. B-16
Toxaphene	6	1,000	1	1,000	Ref. 2, p. B-16
1,2,4-Trichlorobenzene	1, 4, 5, 6, 7, and 8	1,000	0.4	400	Ref. 2, p. B-16
1,1,1-Trichloroethane	6	1	0.4	0.4	Ref. 2, p. B-17
Trichloroethene	1, 4, and 6	10	0.4	4	Ref. 2, p. B-17
2,4,6-Trichlorophenol	4, 5, and 6	10	1	10	Ref. 2, p. B-17
Xylenes (total)	1, 4, 6, and 7	10	0.4	4	Ref. 2, p. B-18
Zinc	1, 2, 3, 4, 5, and 8	10	1	10	Ref. 2, p. B-18

Note:

* Aroclors are PCBs and as such have been given the values for PCBs that are presented in SCDM (Ref. 2).

The Sauget Area 1 site's toxicity and persistence factor value has been assigned using PCBs, arsenic, benzo(a)pyrene, beryllium, cadmium, chromium, lead, mercury, and 1,2,4,5-tetrachlorobenzene, all of which have a toxicity value of 10,000 and a persistence value of 1. Thus, the site's

4.1.2.2.1 Toxicity/Persistence (continued)

toxicity/persistence factor value is 10,000.

Toxicity/Persistence Factor Value: 10,000

4.1.2.2.2 Hazardous Waste Quantity

The following table presents information about the quantity of hazardous waste associated with each source that has a containment value greater than zero.

Source Number	Source Name	Source Hazardous Waste Quantity Value (Section 2.4.2.1.5)	Is Source Hazardous Constituent Quantity Data Complete? (yes/no)
Source 1	CS-A	8,009.62	No
Source 2	CS-B	8,400	No
Source 3	CS-C through CS-E	>0	No
Source 4	Source G	74.12	No
Source 5	Source H	92.12	No
Source 6	Source I	245.38	No
Source 7	Source L	584.62	No
Source 8	Source M	4,553.85	No
Source 9	Source N	32.03	No

Sum of values: 21,991.74

The hazardous waste quantity (HWQ) factor value is determined from the HRS final rule, Table 2-6 (Ref. 1, p. 51591). Because the sum of the HWQ values is 21,991.74, the assigned factor value is 10,000.

Hazardous Waste Quantity Factor Value: 10,000

4.1.2.2.3 Waste Characteristics Factor Category Value

The waste characteristics factor category value is determined by multiplying the combined toxicity/persistence factor value by the HWQ factor value. This product is then assigned a value from the HRS final rule, Table 2-7 (Ref. 1, p. 51592).

Toxicity/persistence factor value
x Hazardous Waste Quantity Factor Value: 1 x 10^8
Waste Characteristics Factor Category Value: 100

4.1.2.3 Drinking Water Targets

No drinking water intakes are known to be located within the 15-mile TDL (Ref. 35; Ref. 55). The city of St. Louis obtains its supply from the Mississippi River upstream of the TDL, at river mile 190.4 (Ref. 54). The city of East St. Louis obtains its water supply from the Mississippi River upstream of the TDL at river mile 180 (Ref. 35).

4.1.2.3.1 Nearest Intake

The nearest downstream drinking water intake from the Mississippi River in Missouri is about 20 miles downstream of the confluence with the Cahokia Chute near Festus, Missouri (Ref. 55). The nearest downstream drinking water intake in Illinois is on the Mississippi River at river mile 110, about 64 miles downstream of the confluence with the Cahokia Chute (Ref. 35).

Because there are no drinking water intakes within the TDL, the nearest intake is assigned a value of zero.

Nearest Intake Factor Value: 0

4.1.2.3.2 Population

The following subsections identify the population factors for the human food chain threat.

4.1.2.3.2.2 Level I Concentration

There are no known populations subject to Level I concentrations from the site.

Level I Population Factor Value: 0

4.1.2.3.2.3 Level II Concentration

There are no known populations subject to Level II concentrations from the site.

Level II Population Factor Value: 0

4.1.2.3.2.4 Potential Contamination

There are no known populations subject to potential contamination within the 15-mile target distance limit (Ref. 35; Ref. 55).

Potential Contamination Factor Value: 0

4.1.2.3.3 Resources

The Mississippi River is considered usable for drinking water purposes within the target distance limit because municipal drinking water intakes are upstream and downstream of the surface water migration pathway (Ref. 35; Ref. 54; Ref. 55).

Resources Factor Value: 5

4.1.3 Human Food Chain Threat

The human food chain threat is based on likelihood of release, waste characteristics, and targets. The same likelihood of release factor category value that applies to the drinking water threat applies to the human food chain threat.

4.1.3.2 Waste Characteristics

Waste characteristics for the human food chain threat are based on toxicity, persistence, bioaccumulation, and hazardous waste quantity. These factors are discussed below.

4.1.3.2.1 Toxicity/Persistence/Bioaccumulation

The table below includes toxicity, persistence, and human food chain bioaccumulation factor values for those hazardous substances which have been detected in the Sauget Area 1 sources and are available to migrate to surface water. The individual factor values were obtained from the EPA SCDM (Ref. 2), and the combined toxicity, persistence, and bioaccumulation factor values were obtained from Table 4-16 of the HRS final rule (Ref. 1, p. 51619). Those substances for which no toxicity factor value is presented in SCDM have been omitted from the table below.

Hazardous Substance	Toxicity Factor Value	Persistence Factor Value	Bioaccumulation Potential Factor Value	Toxicity/ Persistence/ Bioaccumulation	Reference
Acetone	10	0.0007	0.5	0.0035	Ref. 2, p. B-1
Anthracene	10	0.4	5,000	2×10^4	Ref. 2, p. B-2
Antimony	10,000	1	0.5	5×10^3	Ref. 2, p. B-2
Aroclor 1221*	10,000	1	50,000	5×10^8	Ref. 2, p. B-13
Aroclor 1232*	10,000	1	50,000	5×10^8	Ref. 2, p. B-13
Aroclor 1242*	10,000	1	50,000	5×10^8	Ref. 2, p. B-13
Aroclor 1248*	10,000	1	50,000	5×10^8	Ref. 2, p. B-13
Aroclor 1254*	10,000	1	50,000	5×10^8	Ref. 2, p. B-13
Aroclor 1260*	10,000	1	50,000	5×10^8	Ref. 2, p. B-13
Arsenic	10,000	1	5	5×10^4	Ref. 2, p. B-2
Benzene	100	0.4	5,000	2×10^5	Ref. 2, p. B-2
Benzo(a)anthracene	1,000	1	50,000	5×10^7	Ref. 2, p. B-2
Benzo(a)pyrene	10,000	1	50,000	5×10^8	Ref. 2, p. B-2

4.1.3.2.1 Toxicity/Persistence/Bioaccumulation (continued)

Hazardous Substance	Toxicity Factor Value	Persistence Factor Value	Bioaccumulation Potential Factor Value	Toxicity/ Persistence/ Bioaccumulation	Reference
Beryllium	10,000	1	50	5×10^5	Ref. 2, p. B-3
Bis(2-ethylhexyl)-phthalate	100	1	50,000	5×10^6	Ref. 2, p. B-3
Butylbenzylphthalate	10	1	500	5×10^3	Ref. 2, p. B-3
Cadmium	10,000	1	5,000	5×10^7	Ref. 2, p. B-4
4-Chloroaniline	1,000	0.07	5	350	Ref. 2, p. B-4
Chlorobenzene	100	0.0007	50	3.5	Ref. 2, p. B-4
Chloroform	100	0.4	5	2×10^2	Ref. 2, p. B-4
2-Chlorophenol	100	0.4	500	2×10^4	Ref. 2, p. B-5
Chromium	10,000	1	5	5×10^4	Ref. 2, p. B-5
Cyanide	100	0.4	0.5	20	Ref. 2, p. B-5
4,4'-DDD	100	1	50,000	5×10^6	Ref. 2, p. B-6
4,4'-DDE	100	1	50,000	5×10^6	Ref. 2, p. B-6
4,4'-DDT	1,000	1	50,000	5×10^7	Ref. 2, p. B-6
Dibenzo(a,h)anthracene	No value	1	50,000	No value	Ref. 2, p. B-6
1,2-Dichlorobenzene	10	0.4	50	2×10^2	Ref. 2, p. B-6
1,4-Dichlorobenzene	10	0.4	50	2×10^2	Ref. 2, p. B-6
3,3'-Dichlorobenzidine	100	1	500	5×10^4	Ref. 2, p. B-7
Dichlorodifluoro-methane	10	0.4	50	2×10^2	Ref. 2, p. B-7
1,1-Dichloroethane	10	0.4	5	20	Ref. 2, p. B-7
1,1 Dichloroethene	100	0.4	50	2×10^3	Ref. 2, p. B-7
1,2-Dichloroethane	100	0.4	5	2×10^2	Ref. 2, p. B-7
2,4-Dichlorophenol	1,000	1	500	5×10^5	Ref. 2, p. B-7
Di-n-butylphthalate	10	1	5,000	5×10^4	Ref. 2, p. B-6
Di-n-octylphthalate	100	1	500	5×10^4	Ref. 2, p. B-6
Ethylbenzene	10	0.4	50	2×10^2	Ref. 2, p. B-9
Fluorene	100	1	5,000	5×10^5	Ref. 2, p. B-9
Hexachlorobenzene	1,000	1	5,000	5×10^6	Ref. 2, p. B-10
Lead	10,000	1	50	5×10^5	Ref. 2, p. B-11
Mercury	10,000	1	50,000	5×10^8	Ref. 2, p. B-11
Methylene chloride	10	0.4	5	20	Ref. 2, p. B-11
Naphthalene	1	0.4	500	2×10^2	Ref. 2, p. B-12
Nickel	100	1	0.5	50	Ref. 2, p. B-12
2-Nitroaniline	1	0.4	5	2	Ref. 2, p. B-12
4-Nitroaniline	1	0.4	5	2	Ref. 2, p. B-12
4-Nitrophenol	1	1	5	5	Ref. 2, p. B-13
N-Nitrosodiphenyl-amine	10	1	500	5×10^3	Ref. 2, p. B-13

4.1.3.2.1 Toxicity/Persistence/Bioaccumulation (continued)

Hazardous Substance	Toxicity Factor Value	Persistence Factor Value	Bioaccumulation Potential Factor Value	Toxicity/ Persistence/ Bioaccumulation	Reference
Pentachlorobenzene	1,000	1	5,000	5×10^6	Ref. 2, p. B-13
Pentachlorophenol	100	1	500	5×10^4	Ref. 2, p. B-14
Phenol	1	1	5	5	Ref. 2, p. B-14
Pyrene	100	1	50	5×10^3	Ref. 2, p. B-15
Silver	100	1	50	5×10^3	Ref. 2, p. B-15
1,2,4,5-Tetrachlorobenzene	10,000	1	5,000	5×10^7	Ref. 2, p. B-15
Tetrachloroethene	100	0.4	50	2×10^3	Ref. 2, p. B-16
Thallium	1,000	1	500	5×10^5	Ref. 2, p. B-16
Toluene	10	0.4	50	2×10^2	Ref. 2, p. B-16
Toxaphene	1,000	1	50,000	5×10^7	Ref. 2, p. B-16
1,2,4-Trichlorobenzene	1,000	0.4	500	2×10^5	Ref. 2, p. B-16
1,1,1-Trichloroethane	1	0.4	5	2	Ref. 2, p. B-17
Trichloroethene	10	0.4	50	2×10^2	Ref. 2, p. B-17
2,4,6-Trichlorophenol	10	1	500	5×10^3	Ref. 2, p. B-17
Xylenes (total)	10	0.4	50	2×10^2	Ref. 2, p. B-18
Zinc	10	1	500	5×10^3	Ref. 2, p. B-18

Note:

* Aroclors are PCBs and as such have been given the values for PCBs that are presented in SCDM (Ref. 2).

The Sauget Area 1 site's toxicity, persistence, and bioaccumulation factor value for the human food chain threat has been assigned using PCBs, benzo(a)pyrene, dibenzo(a,h)anthracene, and mercury, which all have a toxicity value of 10,000, a persistence value of 1, and a bioaccumulation value of 50,000. Thus, the site's toxicity/persistence/bioaccumulation factor value is 500,000,000, or 5×10^8.

Toxicity/Persistence/Bioaccumulation Factor Value: 5×10^8

4.1.3.2.2 Hazardous Waste Quantity

The hazardous waste quantity factor value of 10,000 (as shown in Section 4.1.2.2.2) applies to the human food chain threat.

Hazardous Waste Quantity Factor Value: 10,000

4.1.3.2.3 Waste Characteristics Factor Category Value

The toxicity/persistence factor value for PCBs, benzo(a)pyrene, and mercury is 10,000. This combined factor value multiplied by the hazardous waste quantity factor value of 10,000 is equal to the maximum factor value of 1×10^8.

Toxicity/persistence factor value
x hazardous waste quantity factor value: 1×10^8

The above product (1×10^8) multiplied by the bioaccumulation potential factor value for PCBs, benzo(a)pyrene, and mercury (50,000) is 5×10^{12}. This value exceeds the maximum factor value of 1×10^{12}; therefore, the maximum factor value is assigned for the waste characteristics product. Using Table 2-7 of Ref. 1, a waste characteristics factor category value of 1,000 is assigned (Ref. 1, p. 51592).

(Toxicity/persistence x hazardous waste quantity)
x bioaccumulation potential factor value: 1×10^{12}

Waste Characteristics Factor Category Value: 1,000

4.1.3.3 Human Food Chain Threat-Targets

Fisheries downstream of the Sauget Area 1 site exist in Old Prairie duPont Creek, the Cahokia Chute, and the Mississippi River (Refs. 42 and 43).

An observed release to surface water has been documented in the wetland in CS-F. The nearest fishery is Old Prairie duPont Creek, which is downstream of the wetland (Ref. 42). Because the nearest fishery is downstream of the observed release area, no human food chain targets are subject to Level I or II concentrations from the Sauget Area 1 site at this time.

4.1.3.3.1 Food Chain Individual

Although no fishery is subject to actual contamination, observed releases of several hazardous substances having bioaccumulation potential factor values of 500 or greater have occurred in Dead Creek. The PCBs Aroclor 1254 and 1260, cadmium, copper, mercury, and zinc all have bioaccumulation potential factor values of 500 or greater and were detected in the Dead Creek sediment sample X111 at concentrations above background levels. Because fisheries exist within the target distance limit, a food chain individual factor value of 20 applies to the human food chain threat (Ref. 1, p. 51620).

Sample ID: X111
Hazardous Substances: Aroclor 1254; Aroclor 1260; cadmium; copper; mercury; and zinc (Ref. 4b, pp. 122 and 159)
Bioaccumulation Potential: 50,000; 50,000; 5,000; 50,000; 50,000; and 500 (Ref. 2)

Food Chain Individual Factor Value: 20

4.1.3.3.2 Population

The following subsections identify the population factors for the human food chain threat.

4.1.3.3.2.1 Level I Concentrations

No human food chain targets are known to be subject to Level I concentrations of hazardous substances.

Level I Population Factor Value: 0

4.1.3.3.2.2 Level II Concentrations

No human food chain targets are known to be subject to Level II concentrations of hazardous substances.

Level II Population Factor Value: 0

4.1.3.3.2.3 Potential Human Food Chain Contamination

Three fisheries are located within the 15-mile TDL for the surface water migration pathway (Refs. 42 and 43). The potential human food chain contamination factor value is based on annual fishery production rates and average annual flows. These values are not available for some of the target fisheries (Refs. 43, 44, and 45) and were estimated. The flow rates for the Old Prairie duPont Creek and the Cahokia Chute of the Mississippi River were estimated based on topographic maps and observations made by EPA representatives (Ref. 63). Annual production, annual flow, and calculation of the potential human food chain contamination factor value are summarized in the following table.

Identity of Fishery	Annual Production (pounds)	Type of Surface Water Body	Average Annual Flow (cfs[1])	Reference	Population Value (P_i)	Dilution Weight (D_i)	P_iD_i
Old Prairie duPont Creek	Unknown but >0 (0 to 100)	Small to moderate stream	10 to 100	Ref. 42, 63	0.03	0.1	3×10^{-3}
Cahokia Chute	Unknown but >0 (0 to 100)	Large stream to river	1,000 to 10,000	Ref. 43, 63	0.03	0.001	3×10^{-5}
Mississippi River	21,738	Very large river	>100,000	Refs. 36, 43, and 44	31	0.00001	3.1×10^{-4}

Note:

[1] cfs = cubic feet per second

Sum of $P_i \times D_i$: 3.34×10^{-3}
(Sum of $P_i \times D_i$)/10: 3.34×10^{-4}

No annual harvest data for Old Prairie duPont Creek and the Cahokia Chute are available (Ref. 43; Ref. 45, p. 2). Because these water bodies are used for fishing, some amount of fish is harvested each year, and a conservative estimate of greater than 0 pounds is used for the calculation of the potential human food chain contamination factor value. The annual production value for the Mississippi River within the TDL (approximate river miles 161 to 174) is not measured (Refs. 36, 43, and 45). Data for the harvest between river mile 0 and 200.5 was averaged over two years, divided by 200.5 river miles, and multiplied by the number of miles in the TDL to estimate the annual production for the 12.2 miles of the Mississippi River that falls in the TDL. The calculations for the annual production of the Mississippi River fishery are as follows:

437,512 pounds in 1990 (Ref. 36)
+277,007 pounds in 1991 (Ref. 36)
714,519

714,519/2 = 357,259.5 pounds (average production for two years)

357,259.5 pounds = 1,781.8 pounds per river mile
200.5 river miles

Fisheries production for the Mississippi River within the TDL:

1,781.8 pounds per river mile
x 12.2 river miles in TDL
21,738.9 pounds

Flow rates have not been measured for the Old Prairie duPont Creek and Cahokia Chute (Ref. 44). The estimated surface water body types are based on the apparent sizes of these two water bodies in topographical maps and during field observations (Ref. 8 and Ref. 14, p. 4). The average annual flow rates for these water body types were obtained from Table 4-13 of the HRS final rule (Ref. 1, p. 51613). Population values (P_i) were obtained from Table 4-18 of the HRS (Ref. 1, p. 51621), and dilution weights (D_i) were obtained from Table 4-13 of the HRS (Ref. 1, p. 51613).

Potential Human Food Chain Contamination Factor: 3.34×10^{-4}

4.1.4 Environmental Threat

The environmental threat is based on likelihood of release, waste characteristics, and targets. The same likelihood of release factor category value assigned to the drinking water and human food chain threats applies to the environmental threat.

4.1.4.2 Waste Characteristics

The following subsections describe the evaluation of the waste characteristics factor value of the environmental threat.

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation

The table below shows ecosystem toxicity, persistence, and bioaccumulation factor values for the hazardous substances in sources having non-zero containment factor values for the surface water migration pathway. All of the substances listed below have been detected in soil samples collected from the sources and are available to migrate to surface water. The individual factor values were obtained from Appendix B-1 of the EPA SCDM (Ref. 2), and the combined ecosystem toxicity, persistence, and bioaccumulation factor values were obtained from Table 4-21 of the HRS Final Rule (Ref. 1, p. 51622). Those substances for which no ecosystem toxicity factor value was presented in SCDM have been omitted from the table below.

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value	Persistence Factor Value	Bioaccumulation Factor Value	Ecosystem Toxicity/ Persistence/ Bioaccumulation Factor Value	Reference
Acetone	3 and 7	10	0.0007	0.5	0.0035	Ref. 2, p. B-1
Aluminum	4	No value	1	50	No value	Ref. 2, p. B-1
Anthracene	4, 5, 6, and 7	10,000	0.4	5,000	2×10^7	Ref. 2, p. B-2
Aroclor 1221*	1	10,000	1	50,000	5×10^8	Ref. 2, p. B-13

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation (continued)

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value	Persistence Factor Value	Bioaccumulation Factor Value	Ecosystem Toxicity/ Persistence/ Bioaccumulation Factor Value	Reference
Aroclor 1232*	1	10,000	1	50,000	5×10^8	Ref. 2, p. B-13
Aroclor 1242*	6	10,000	1	50,000	5×10^8	Ref. 2, p. B-13
Aroclor 1248*	1, 3, 4, and 8	10,000	1	50,000	5×10^8	Ref. 2, p. B-13
Aroclor 1254*	1, 2, 3, 4, 6, and 8	10,000	1	50,000	5×10^8	Ref. 2, p. B-13
Aroclor 1260*	1, 2, 3, 4, 5, 6, 7, and 8	10,000	1	50,000	5×10^8	Ref. 2, p. B-13
Arsenic	1 and 3	10	1	50	5×10^2	Ref. 2, p. B-2
Benzene	4, 5, 6, and 7	100	0.4	500	2×10^4	Ref. 2, p. B-2
Benzo(a)anthracene	3, 4, 5, and 7	10,000	1	50,000	5×10^8	Ref. 2, p. B-2
Benzo(a)pyrene	3, 4, and 7	10,000	1	50,000	5×10^8	Ref. 2, p. B-2
Bis(2-ethylhexyl) phthalate	1, 2, 4, 6, 7, and 9	1,000	1	50,000	5×10^7	Ref. 2, p. B-3
Butylbenzylphthalate	7	100	1	500	5×10^4	Ref. 2, p. B-3
Cadmium	1, 2, 3, 4, 5, 6, 7, and 8	1,000	1	5,000	5×10^6	Ref. 2, p. B-4
4-Chloroaniline	1, 6, and 7	10,000	0.07	5	3.5×10^3	Ref. 2, p. B-4
Chlorobenzene	1, 3, 4, 5, 6, 7, and 8	1,000	0.0007	50	35	Ref. 2, p. B-4
Chloroform	4, 5, and 7	10	0.4	5	20	Ref. 2, p. B-4
2-Chlorophenol	7	100	0.4	500	2×10^4	Ref. 2, p. B-5
Chromium	1, 2, 3, 4, 5, 6, and 8	10,000	1	5	5×10^3	Ref. 2, p. B-5
Chrysene	3, 4, 5, 7, and 8	1,000	1	5,000	5×10^6	Ref. 2, p. B-5

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation (continued)

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value	Persistence Factor Value	Bioaccumulation Factor Value	Ecosystem Toxicity/ Persistence/ Bioaccumulation Factor Value	Reference
Copper	1, 3, 4, 5, 6, and 8	100	1	50,000	5×10^6	Ref. 2, p. B-5
Cyanide	4 and 5	1,000	0.4	0.5	2×10^2	Ref. 2, p. B-5
4,4'-DDD	5 and 6	10,000	1	50,000	5×10^8	Ref. 2, p. B-6
4,4'-DDE	4 and 5	10,000	1	50,000	5×10^8	Ref. 2, p. B-6
4,4'-DDT	5 and 6	10,000	1	50,000	5×10^8	Ref. 2, p. B-6
1,2-Dichlorobenzene	1, 5, 6, 7, and 8	100	0.4	50	2×10^3	Ref. 2, p. B-6
1,3-Dichlorobenzene	6 and 7	100	0.4	50	2×10^3	Ref. 2, p. B-6
1,4-Dichlorobenzene	1, 2, 4, 5, 6, 7, and 8	100	0.4	50	2×10^3	Ref. 2, p. B-6
1,2-Dichloroethane (total)	1 and 6	100	0.4	5	2×10^2	Ref. 2, p. B-7
2,4-Dichlorophenol	4, 5, 6, and 7	100	1	500	5×10^4	Ref. 2, p. B-7
Di-n-butylphthalate	7	1,000	1	5,000	5×10^6	Ref. 2, p. B-6
Ethylbenzene	1, 2, 4, and 6	100	0.4	50	2×10^3	Ref. 2, p. B-9
Fluorene	5 and 7	1,000	1	5,000	5×10^6	Ref. 2, p. B-9
Hexachlorobenzene	4, 5, and 7	10	1	50,000	5×10^5	Ref. 2, p. B-10
Iron	1, 2, 3, 4, 5, and 8	10	0.4	0.5	2	Ref. 2, p. B-11
Lead	1, 2, 3, 5, 6, and 8	1,000	1	5,000	5×10^6	Ref. 2, p. B-11
Mercury	1, 2, 3, 4, 5, 6, and 7	10,000	1	50,000	5×10^8	Ref. 2, p. B-11
Methylene chloride	6	1	0.4	5	2	Ref. 2, p. B-12

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation (continued)

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value	Persistence Factor Value	Bioaccumulation Factor Value	Ecosystem Toxicity/ Persistence/ Bioaccumulation Factor Value	Reference
2-Methylnaphthalene	5 and 6	1,000	0.4	5,000	2×10^6	Ref. 2, p. B-12
Naphthalene	4, 5, 6, and 7	1,000	0.4	500	2×10^5	Ref. 2, p. B-12
Nickel	1, 3, 4, 5, 6, 7, and 8	10	1	500	5×10^3	Ref. 2, p. B-12
2-Nitroaniline	4	1	0.4	5	2	Ref. 2, p. B-12
4-Nitroaniline	5	1	0.4	5	2	Ref. 2, p. B-12
4-Nitrophenol	4	100	1	500	5×10^4	Ref. 2, p. B-13
N-Nitrosodiphenyl-amine	4	100	1	500	5×10^4	Ref. 2, p. B-13
Pentachlorobenzene	1	100	1	5,000	5×10^5	Ref. 12, p. B-13
Pentachlorophenol	4, 6, and 7	100	1	5,000	5×10^5	Ref. 2, p. B-14
Phenanthrene	4, 5, 6, 7, and 9	1,000	0.4	5,000	2×10^6	Ref. 2, p. B-14
Phenol	4, 6, and 7	10,000	1	5	5×10^4	Ref. 2, p. B-14
Silver	1, 2, 3, 4, and 8	10,000	1	50	5×10^5	Ref. 2, p. B-15
1,2,4,5-Tetrachlorobenzene	1	100	1	5,000	5×10^5	Ref. 2, p. B-15
Tetrachloroethene	4 and 6	100	0.4	100	4×10^3	Ref. 2, p. B-16
Toluene	2, 4, 5, 6, and 7	100	0.4	50	2×10^3	Ref. 2, p. B-16
Toxaphene	6	10,000	1	50,000	5×10^8	Ref. 2, p. B-16
1,2,4-Trichlorobenzene	1, 4, 5, 6, 7, and 8	1,000	0.4	500	2×10^5	Ref. 2, p. B-16
1,1,1-Trichloroethane	6	10	0.4	5	20	Ref. 2, p. B-17
Trichloroethene	1, 4, and 6	100	0.4	50	2×10^3	Ref. 2, p. B-17

4.1.4.2.1 Ecosystem Toxicity/Persistence/Bioaccumulation (continued)

Hazardous Substance	Source No.	Ecosystem Toxicity Factor Value	Persistence Factor Value	Bioaccumulation Factor Value	Ecosystem Toxicity/ Persistence/ Bioaccumulation Factor Value	Reference
2,4,6-Trichlorophenol	4, 5, and 6	1,000	1	5,000	5×10^6	Ref. 2, p. B-17
Xylenes (total)	1, 4, 6, and 7	100	0.4	500	2×10^4	Ref. 2, p. B-18
Zinc	1, 2, 3, 4, 5, and 8	10	1	500	5×10^3	Ref. 2, p. B-18

Note: * Aroclors are PCBs and as such have been given the values for PCBs that are presented in SCDM (Ref. 2).

The Sauget Area 1 site's ecosystem toxicity, persistence, and environmental bioaccumulation factor value has been assigned using PCBs, benzo(a)anthracene, benzo(a)pyrene, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, mercury, and toxaphene. All of these substances have an ecosystem toxicity value of 10,000, a persistence value of 1, and a bioaccumulation value of 50,000. Thus, the site's ecosystem toxicity/persistence/bioaccumulation factor value is 500,000,000, or 5×10^8.

Ecosystem Toxicity/Persistence/Bioaccumulation Factor Value: 5×10^8

4.1.4.2.2 Hazardous Waste Quantity

The hazardous waste quantity factor value of 10,000 assigned in Section 4.1.2.2.2 applies to the environmental threat.

Hazardous Waste Quantity Factor Value: 10,000

4.1.4.2.3 Waste Characteristics Factor Category Value

The combined ecosystem toxicity and persistence factor value for PCBs, benzo(a)anthracene, benzo(a)pyrene, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, mercury, and toxaphene is 10,000. This value multiplied by the hazardous waste quantity factor value of 10,000 is 100,000,000, or 1 x 10^8. The maximum ecosystem toxicity/persistence and hazardous waste quantity factor value applies.

Ecosystem toxicity/persistence factor value
x hazardous waste quantity factor value: 1 x 10^8

The bioaccumulation potential factor value for PCBs, benzo(a)anthracene, benzo(a)pyrene, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, mercury, and toxaphene is 50,000. This value multiplied by the above product of 1 x 10^8 is equal to 5 x 10^{12}, which is above the maximum product of 1 x 10^{12}. The maximum value applies, and according to Table 2-7 of the HRS Final Rule, a waste characteristics factor category value of 1,000 is assigned (Ref. 1, p. 51592).

(Ecosystem toxicity/persistence x hazardous waste quantity)
x bioaccumulation potential factor value: 1 x 10^{12}

Waste Characteristics Factor Category Value: 1,000

4.1.4.3 Environmental Threat - Targets

Most Distant Level I Sample

No level I samples have been identified.

Most Distant Level II Sample

Sample ID: X111
Distance from the probable point of entry: 3,500 feet
Reference: Ref. 4a, pp. 3-4 to 3-7; Ref. 4b, pp. 122 and 159; see also Figure 10 of the documentation record

4.1.4.3.1 Sensitive Environments

The following subsections describe the sensitive environments subject to actual contamination.

4.1.4.3.1.1 Level I Concentrations

No wetlands or other sensitive environments are known to be subject to Level I concentrations of hazardous substances. The sediment sample collected in the wetland adjacent to Dead Creek Segment CS-F cannot be used to establish Level I concentrations because available benchmarks apply to aqueous samples only.

4.1.4.3.1.2 Level II Concentrations

The wetland adjacent to Dead Creek segment CS-F is subject to Level II concentrations of Aroclors 1254 and 1260, cadmium, copper, lead, mercury, nickel, and zinc (Ref. 4b, pp. 122 and 159). These substances were detected in the wetland above background levels (Ref. 4b, pp. 131 and 160) and are attributable to the site (Ref. 6, p. 85; Ref. 15b, p. 11; Ref. 15f, p. 11; Ref. 15g, p. 54; Ref. 15h, pp. 11, 19, and 27). The distance between the PPE at the north (upstream) end of the wetland and the sample X111 location is approximately 3,500 feet (Ref. 25; see also Figure 10 of the documentation

record). Because wetland vegetation exists along either side of Dead Creek within this reach (Ref. 25), 7,000 feet of wetland frontage is considered subject to Level II concentrations. No other sensitive environments are known to be subject to Level II concentrations from the Sauget Area 1 site. The wetland frontage ubject to Level II concentrations is summarized below. The wetlands value was obtained from Ta ɔle 4-24 of the HRS Final Rule (Ref. 1, p. 51625).

Wetland	Wetland Frontage	Reference
CS-F	7,000 feet (1.33 miles)	Ref. 25

Total Wetland Frontage: 7,000 feet (1.33 miles)

Wetland Value: 50

No other sensitive environments are subject to Level II concentrations of hazardous substances. Therefore, the sensitive env ronments value is zero.

Sum of Sensitive Environments Value + Wetland Value: 50

Level II Concentrations Value: 50

4.1.4.3.1.3 Potential Contamination

Sensitive Environments

Sensitive environments subject to potential contamination along the surface water migration pathway include habitat used by federally and state-designated endangered and threatened species. Four species of birds that are endangered in Illinois nest in Cahokia and are thought to feed in wetlands and the Mississippi River within 10 miles of the nesting site (Ref. 46). In addition, the bald eagle, a federally endangered species, has nested on Arsenal Island, where the Cahokia Chute meets the Mississippi River (Ref. 37). Both the Cahokia Chute and the Mississippi River are considered habitat for the bald eagle.

According to the Illinois Endangered Species Protection Board, the Indiana bat, a federally-designated endangered species, and another six state-designated endangered or threatened animal species use the Mississippi River in St. Clair and Monroe Counties, which border the TDL (Ref. 31). In addition, one federally endangered fish species and one state designated endangered snail species endangered in Missouri exist in the Mississippi River within the TDL (Ref. 41; Ref. 49, pp. 1 and 2). One federally endangered plant species is known to exist along the Mississippi River within the TDL (Ref. 49). Sensitive environments subject to potential contamination from the Sauget Area 1 site are summarized in the table below. Sensitive environment values were obtained from Table 4-23 of the HRS Final Rule (Ref. 1, p. 51624). The habitat for each species is considered a separate sensitive environment, and the values for each species were added together for each type of surface water body.

Type of Surface Water Body	Sensitive Environment	Reference(s)	Sensitive Environment Value(s)
Cahokia Chute (large stream to river)	Habitat for bald eagle (federal designated endangered species)	Ref. 31, p. 85; Ref. 37, p. 1	75
Mississippi River (very large river)	Habitat for bald eagle, Indiana bat, decurrent false aster, and palled sturgeon (federal designated endangered species)	Ref. 31, pp. 85 and 102; Ref. 49, pp. 1 and 2	75 x 4 species = 300

4.1.4.3.1.3 Potential Contamination (continued)

Type of Surface Water Body	Sensitive Environment	Reference(s)	Sensitive Environment Value(s)
Mississippi River (very large river)	Habitat for cave snail, pondhorn, Illinois chorus frog, American bittern, great egret, little blue heron, snowy egret, common moorhen, black-crowned night heron, pied-billed grebe, and river otter (state designated endangered or threatened animal species)	Ref. 31, pp. 24, 65, 74, 76, 80, 81, 83, 89, 91, and 99; Ref. 41	50 x 11 species = 550

Wetlands

Wetlands occur along the Cahokia Chute and the Mississippi River within the TDL and are assigned a value from Table 4-24 of the HRS final rule (Ref. 1, p. 51625). The wetland along Dead Creek in CS-F is subject to Level II concentrations and is not included in the evaluation of wetland subject to potential contamination. Wetland frontage within the TDL was measured from NWI maps (Ref. 25; Ref. 26; Ref. 27) and is summarized below.

Type of Surface Water Body	Wetlands Frontage	Reference(s)	Wetlands Rating Value for Type of Surface Water Body
Old Prairie duPont Creek (small to moderate stream)	2,112 feet (0.4 mile)	Ref. 25	25
Cahokia Chute (large stream to river)	5,280 feet (1 mile)	Ref. 25	25
Mississippi River (very large river)	60,300 feet (11.42 miles)	Ref. 25; Ref. 26; Ref. 27	250

The following table summarizes the sensitive environment and wetland values for each of the applicable surface water bodies and shows the calculations used for the potential contamination factor value.

4.1.4.3.1.3 Potential Contamination (continued)

Type of Surface Water Body	Sum of Sensitive Environment Values (S_j)	Wetland Frontage Value (W_j)	Dilution Weight (D_j)	$D_j(W_j + S_j)$
Old Prairie duPont Creek (small to moderate stream)	0	25	0.1	2.5
Cahokia Chute (large stream to river)	75	25	0.001	0.1
Mississippi River (very large river)	850	250	0.00001	0.011

The sum of the dilution-weighted values for sensitive environments and wetlands is divided by 10 to arrive at the potential contamination factor value of 0.2611.

Sum of $D_j(W_j + S_j)$: 2.611
(Sum of $D_j(W_j + S_j)$)/10: 0.2611

Potential Contamination Factor Value: 0.2611

6.1 AIR MIGRATION PATHWAY

The following subsections provide information on observed releases and the potential for release via the air pathway at the Sauget Area 1 site.

6.1.1 Observed Release

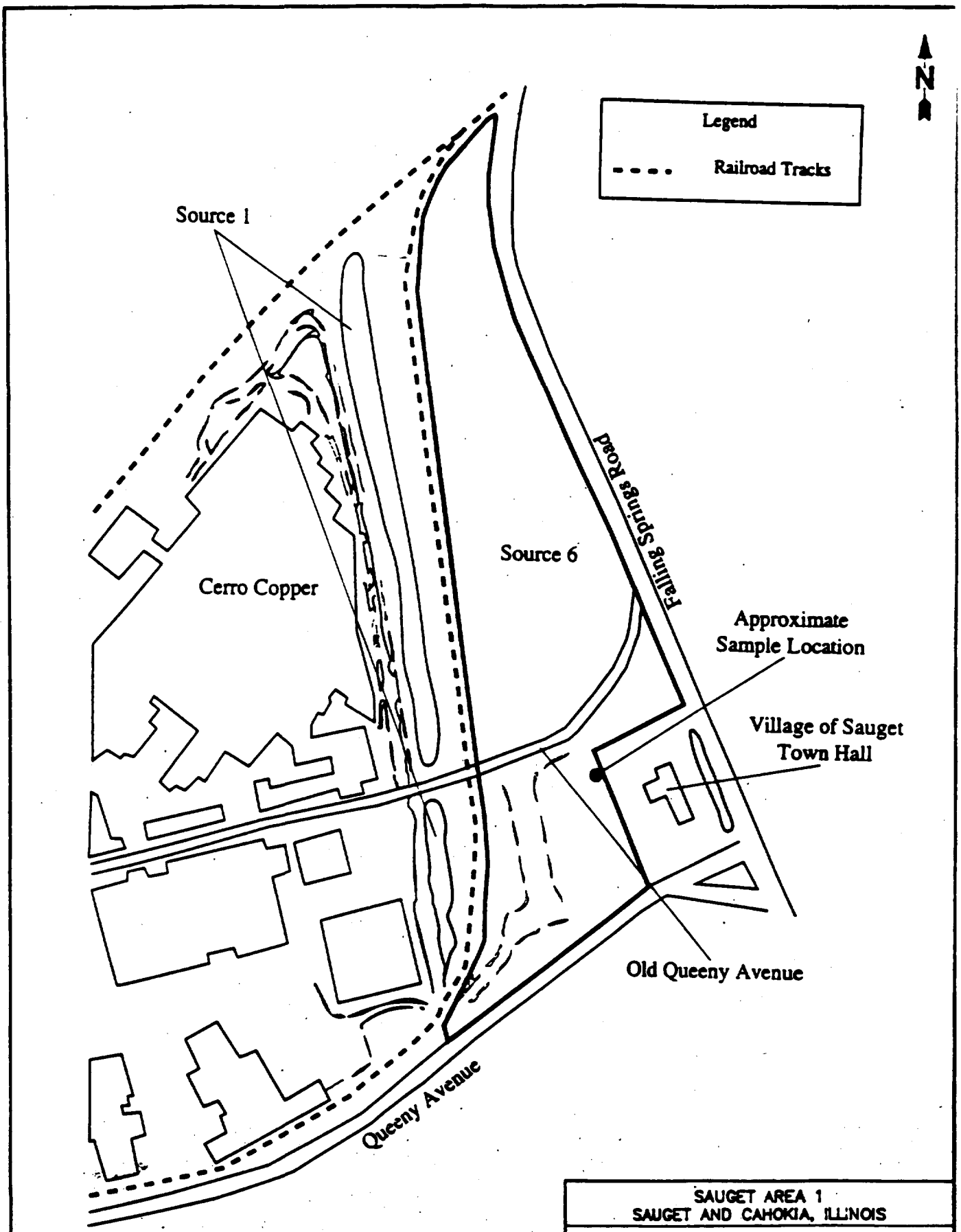
An observed release by direct observation has been documented at the Sauget Area 1 site. The following subsection provides a detailed discussion of the observed release.

Direct Observation

On September 20, 1989, a five-man drilling crew working at Source 6 augured through a buried drum at approximately 8 feet below ground surface (see Figure 12). An unknown amount of vapor was emitted from the drum and into the work space. The crew member working directly over the boring, Mr. Robert Gusman, immediately reported experiencing dizziness and tightness in his chest. Mr. Gusman was taken to the Cerro Copper infirmary and then transported to Alexian Brothers Hospital in St. Louis, Missouri. Mr. Gusman was discharged on September 22, 1989. Three other people who were working at the drill site were admitted to Alexian Brothers Hospital for observation on September 21, 1989. These people were discharged on the same day (Ref. 19, p. 1; Ref. 20, p. 1).

No samples were collected from the drum to document what hazardous substances were released to the air as a result of this incident; therefore, it is impossible to conclusively determine what constituents were released when the drum was punctured. However, according to an Illinois Department of Public Health (IDPH) letter dated May 17, 1990, the symptoms described by Mr. Gusman are consistent with acute overexposure to solvents and can be associated with hazardous substances found in the volatile and semivolatile fraction (Ref. 21, p. 3).

A soil sample was collected from the boring approximately 4 hours after the incident took place. This sample was sent to the Monsanto Krummrich facility for volatile and semivolatile analysis. Monsanto contacted Cerro Copper on September 21, 1989, and told Cerro that the laboratory could not determine "any specific peaks" using a gas chromatograph; furthermore, Monsanto's laboratory



SAUGET AREA 1
SAUGET AND CAHOKIA, ILLINOIS

FIGURE 12
SAMPLE LOCATION FOR SOIL SAMPLE DI02
COLLECTED ON SEPTEMBER 25, 1989

SOURCE: MODIFIED FROM REF. 19, p. 5

NOT TO SCALE

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stated that it could only determine that the sample contained "a heavy distillate with a high boiling point" (Ref. 19, p. 2; Ref. 20, p. 2). Monsanto returned the remainder of the sample to Cerro, who then sent the sample to Envirometrics in St. Louis, Missouri, for analysis (Ref. 19, p. 2; Ref. 20, p. 2). The following table lists the volatile organic compounds detected in the soil sample (JM/G09/22/89-1) collected on September 20, 1989, and the levels at which the hazardous substances were detected. All concentrations are presented in milligrams per kilogram (mg/kg). Sample quantification limits are not available for this sample. While the sample was analyzed using Method 8270 of Document SW-846, the percent solids for the sample and the dilution factor used when running the analysis are not reported in the analytical documentation; therefore, it is not possible to determine the sample-specific quantification limits.

Hazardous Substance	Concentration (mg/kg)	References
Trichloroethene	391	Ref. 52, p. 2
Tetrachloroethene	26	Ref. 52, p. 2
Benzene	11	Ref. 52, p. 2
Toluene	14	Ref. 52, p. 2
Chlorobenzene	121	Ref. 52, p. 2
Ethylbenzene	16	Ref. 52, p. 2

The following table lists the semivolatile organic compounds detected in the soil sample collected on September 20, 1989, and the levels at which the hazardous substances were detected. Sample quantification limits are not available for this sample. While the sample was analyzed using Method 8270 of Document SW-846, the percent solids for the sample and the dilution factor used when running the analysis are not reported in the analytical documentation; therefore, it is not possible to determine the sample-specific quantification limits for this sample.

Hazardous Substance	Concentration (mg/kg)	References
1,2-Dichlorobenzene	86	Ref. 52, p. 1
1,3-Dichlorobenzene	220	Ref. 52, p. 1

Hazardous Substance	Concentration (mg/kg)	References
1,4-Dichlorobenzene	210	Ref. 52, p. 1
Benzyl alcohol	99	Ref. 52, p. 1
2-Methyl naphthalene	4	Ref. 52, p. 1
2,4-Dichlorophenol	360	Ref. 52, p. 1
1,2,4-Trichlorobenzene	140	Ref. 52, p. 1
Hexachlorobenzene	16	Ref. 52, p. 1
Pentatriacontane	500	Ref. 52, p. 1
2,6,10,15-Tetramethyl-heptadecane	410	Ref. 52, p. 1
2,4,6-Trichloro-1,1-biphenyl	150	Ref. 52, p. 1
2,3,6-Trichloro-1,1-biphenyl	210	Ref. 52, p. 1
Docosane	602	Ref. 52, p. 1

On September 25, 1989, Cerro Copper reaugured the location at which the incident occurred and resampled the boring. Cerro collected a soil sample (DI02) from between 9 and 13 feet below ground surface using a split-spoon sampler. Cerro split this sample with IEPA. Analytical results obtained from the soil sample collected on September 25, 1989, documented the presence of volatile and semivolatile organic compounds. Figure 12 shows the location from which the sample was collected. The following table presents concentrations for the volatile organic compounds detected in the soil sample collected on September 25, 1989. All results are presented in mg/kg.

Hazardous Substance	Concentration (mg/kg)	References
Methylene chloride	3.5	Ref. 53, p. 4
1,1-Dichloroethene	6.6	Ref. 53, p. 4
1,2-Dichloroethene (total)	4.9	Ref. 53, p. 4
Benzene	20.0	Ref. 53, p. 4
Tetrachloroethene	12.0	Ref. 53, p. 4
Toluene	21.0	Ref. 53, p. 4

Hazardous Substance	Concentration (mg/kg)	References
Ethylbenzene	9.4	Ref. 53, p. 4
m-Xylene	2.5	Ref. 53, p. 4
o & p-Xylene	2.3	Ref. 53, p. 4
Trichloroethene	D190.0	Ref. 53, p. 6
Chlorobenzene	D130.0	Ref. 53, p. 6

Note:

"D" preceding concentrations denotes concentrations that were obtained at a dilution factor of 10.

The following table presents concentrations for the semivolatile compounds detected in the soil sample collected on September 25, 1989. All of the results presented below were obtained using a dilution factor of 5, except those concentrations that have been marked with an asterisk which were obtained at a dilution factor of 50.

Hazardous Substance	Concentration (mg/kg)	References
Phenol	270	Ref. 53, p. 8
2,4-Dichlorophenol	1,500	Ref. 53, p. 8
2,4,6-Trichlorophenol	220	Ref. 53, p. 8
Hexachlorobenzene	830	Ref. 53, p. 9
3,3'-Dichlorobenzidine	260	Ref. 53, p. 9
1,4-Dichlorobenzene	*3,900	Ref. 53, p. 11
1,2-Dichlorobenzene	*3,100	Ref. 53, p. 11
1,2,4-Trichlorobenzene	*16,000	Ref. 53, p. 11

The following table presents the concentrations for PCBs found in the soil sample collected on September 25, 1989. All of the results presented below were obtained at a dilution factor of 100.

Hazardous Substance	Concentration (mg/kg)	References
Aroclor 1242	10,000	Ref. 53, p. 14
Aroclor 1254	9,800	Ref. 53, p. 14
Aroclor 1260	11,000	Ref. 53, p. 14

During its evaluation of the events that occurred on September 20, 1989, IDPH determined that Mr. Gusman was most likely exposed to volatile and semivolatile solvent vapors emanating from the boring (Ref. 21, p. 3). Furthermore, IDPH concluded that the hazardous substances from which the vapors originated were produced by Monsanto (Ref. 21, p. 2). No additional information is available regarding IDPH's conclusion.

Based on this assumption and the symptoms reported by Mr. Gusman, IDPH concluded that Mr. Gusman was most likely exposed to only those contaminants that are volatile or semivolatile (Ref. 21, pp. 2 and 3). The above information indicates that vapors containing one or more hazardous substance were released to the atmosphere. For this reason, an observed release to the air pathway established by direct observation has been scored for the Sauget Area 1 site.

Chemical Analysis

No observed release by chemical analysis has been established at the Sauget Area 1 site.

Air Observed Release Factor Value: 550

6.1.2 Potential to Release

Because an observed release has been established at the Sauget Area 1 site, the site's potential to release contamination via the air pathway was not evaluated (NE).

Air Potential to Release Factor Value: NE

6.2 WASTE CHARACTERISTICS

The following table presents the toxicity and mobility factors for the hazardous substances found at the Sauget Area 1 sources that have a greater than zero containment factor. All the substances listed below were detected in soil samples collected at the sources and are available to migrate via the air pathway. The toxicity and gas mobility factor values were taken from the SCDM (Ref. 2). The particulate mobility factor value was taken from Figure 6-3 the HRS Final Rule (Ref. 1, p. 51657). The combined toxicity and mobility factor values were obtained from Table 6-13 of the HRS Final Rule (Ref. 1, p. 51660). Those compounds for which no toxicity value is presented in SCDM have been omitted from the table below.

Hazardous Substances	Source	Toxicity Factor Value	Gas Mobility Factor Value	Particulate Mobility Factor Value	Toxicity/ Mobility Factor Value	References
Acetone	3	10	1	NA	10	Ref. 2, p. B-1
Anthracene	4, 5, and 7	10	0.002	0.0002	0.02	Ref. 1, p. 51657; Ref. 2, p. B-2
Antimony	1, 4, and 7	10,000	NA	0.0002	2	Ref. 1, p. 51657; Ref. 2, p. B-2
Aroclor 1221*	1	10,000	0.02	0.0002	200	Ref. 2, p. B-13
Aroclor 1232*	1	10,000	0.02	0.0002	200	Ref. 2, p. B-13
Aroclor 1242*	6	10,000	0.02	0.0002	200	Ref. 2, p. B-13
Aroclor 1248*	1, 3, 4, and 8	10,000	0.02	0.0002	200	Ref. 2, p. B-13
Aroclor 1254*	1, 2, 3, 4, 6, and 8	10,000	0.02	0.0002	200	Ref. 2, p. B-13
Aroclor 1260*	1, 2, 3, 4, 5, 7, 6, and 8	10,000	0.02	0.0002	200	Ref. 2, p. B-13
Arsenic	1 and 3	10,000	NA	0.0002	2	Ref. 1, p. 51657; Ref. 2, p. B-2
Benzene	4, 5, 6, and 7	100	1	NA	100	Ref. 2, p. B-2
Benzo(a)anthracene	3, 4, 5, and 7	1,000	0.0002	0.0002	0.2	Ref. 1, p. 51657; Ref. 2, p. B-2
Benzo(a)pyrene	2, 3, 4, 5, and 7	10,000	0.0002	0.0002	2	Ref. 1, p. 51657; Ref. 2, p. B-2

Hazardous Substances	Source	Toxicity Factor Value	Gas Mobility Factor Value	Particulate Mobility Factor Value	Toxicity/ Mobility Factor Value	References
Beryllium	1 and 4	10,000	NA	0.0002	2	Ref. 1, p. 51657; Ref. 2, p. B-3
Bis(2-ethylhexyl)phthalate	1, 2, 4, 6, 7, and 9	100	0.002	0.0002	0.2	Ref. 1, p. 51657; Ref. 2, p. B-3
Butylbenzylphthalate	7	10	1	0.0002	10	Ref. 1, p. 51657 Ref. 2, p. B-3
Cadmium	1, 2, 3, 4, 5, 6, 7, and 8	10,000	NA	0.0002	2	Ref. 1, p. 51657; Ref. 2, p. B-4
4-Chloroaniline	1, 6, and 7	1,000	0.2	0.0002	200	Ref. 1, p. 51657; Ref. 2, p. B-4
Chlorobenzene	1, 3, 4, 5, 6, 7, and 8	100	1	NA	100	Ref. 2, p. B-4
Chloroform	4, 5, and 7	100	1	NA	100	Ref. 2, p. B-4
2-Chlorophenol	7	100	1	NA	100	Ref. 2, p. B-5
Chromium	1, 2, 3, 4, 5, 6, and 8	10,000	NA	0.0002	2	Ref. 1, p. 51657; Ref. 2, p. B-5
Cyanide	4 and 5	100	NA	0.0002	0.02	Ref. 1, p. 51657; Ref. 2, p. B-5
4,4'-DDD	5 and 6	100	0.002	0.0002	0.2	Ref. 1, p. 51657; Ref. 2, p. B-6
4,4'-DDE	4 and 5	100	0.002	0.0002	0.2	Ref. 1, p. 51657; Ref. 2, p. B-6
4,4'-DDT	5 and 6	1,000	0.002	0.0002	2	Ref. 1, p. 51657; Ref. 2, p. B-6
Dibenzo(a,h)-anthracene	4	No Value	NA	0.0002	No Value	Ref. 1, p. 51657; Ref. 2, p. B-6
1,2-Dichlorobenzene	1, 5, 6, 7, and 8	10	1	NA	10	Ref. 2, p. B-6
1,4-Dichlorobenzene	1, 2, 4, 5, 6, 7, and 8	10	1	NA	10	Ref. 2, p. B-6
3,3'-Dichlorobenzidine	4 and 6	100	0.0002	0.0002	0.02	Ref. 1, p. 51657; Ref. 2, p. B-7

Hazardous Substances	Source	Toxicity Factor Value	Gas Mobility Factor Value	Particulate Mobility Factor Value	Toxicity/ Mobility Factor Value	References
Dichlorodifluoro-methane	1	10	1	NA	10	Ref. 2, p. B-7
1,1-Dichloroethane	1	10	1	NA	10	Ref. 2, p. B-7
1,1-Dichloroethene	6	100	1	NA	100	Ref. 2, p. B-7
1,2-Dichloroethene (total)	1 and 6	100	1	NA	100	Ref. 2, p. B-7
2,4-Dichlorophenol	4, 5, 6, and 7	1,000	0.2	0.0002	200	Ref. 1, p. 51657; Ref. 2, p. B-7
Di-n-butylphthalate	7	10	0.02	0.0002	0.2	Ref. 1, p. 51657; Ref. 2, p. B-6
Di-n-octylphthalate	1 and 2	100	0.002	0.0002	0.2	Ref. 1, p. 51657; Ref. 2, p. B-6
Ethylbenzene	1, 2, 4, and 6	10	1	NA	10	Ref. 2, p. B-9
Fluorene	5 and 7	100	0.2	0.0002	20	Ref. 1, p. 51657 Ref. 2, p. B-9
Hexachlorobenzene	5 and 7	1,000	0.02	0.0002	20	Ref. 1, p. 51657 Ref. 2, p. B-10
Lead	1, 2, 3, 5, 6, and 8	10,000	NA	0.0002	2	Ref. 1, p. 51657; Ref. 2, p. B-11
Mercury	1, 2, 3, 4, 5, 6, and 7	10,000	0.2	0.0002	2,000	Ref. 1, p. 51657; Ref. 2, p. B-11
Methylene chloride	6	10	1	NA	10	Ref. 2, p. B-12
Naphthalene	4, 5, 6, and 7	1	0.2	0.0002	0.2	Ref. 1, p. 51657; Ref. 2, p. B-12
Nickel	1, 3, 4, 5, 6, 7, and 8	100	NA	0.0002	0.02	Ref. 1, p. 51657; Ref. 2, p. B-12
2-Nitroaniline	4	1	0.002	0.0002	0.002	Ref. 1, p. 51657; Ref. 2, p. B-12
4-Nitroaniline	5	1	0.002	0.0002	0.002	Ref. 1, p. 51657; Ref. 2, p. B-12
4-Nitrophenol	4	1	0.02	0.0002	0.02	Ref. 1, p. 51657; Ref. 2, p. B-13

Hazardous Substances	Source	Toxicity Factor Value	Gas Mobility Factor Value	Particulate Mobility Factor Value	Toxicity/ Mobility Factor Value	References
N-Nitrosodiphenylamine	4	10	0.02	0.0002	0.2	Ref. 1, p. 51657; Ref. 2, p. B-13
Pentachlorobenzene	1	1,000	0.2	0.0002	200	Ref. 1, p. 51657; Ref. 2, p. B-13
Pentachlorophenol	4, 6, and 7	100	0.02	0.0002	2	Ref. 1, p. 51657; Ref. 2, p. B-14
Phenol	4, 6, and 7	1	1	NA	1	Ref. 2, p. B-14
Pyrene	3, 4, 7, and 8	100	0.002	0.0002	0.2	Ref. 1, p. 51657; Ref. 2, p. B-14
Silver	1, 2, 3, 4, and 8	100	NA	0.0002	0.02	Ref. 1, p. 51657; Ref. 2, p. B-15
1,2,4,5-Tetrachlorobenzene	1	10,000	0.2	0.0002	2,000	Ref. 1, p. 51657; Ref. 2, p. B-15
Tetrachloroethene	4 and 6	100	1	NA	100	Ref. 2, p. B-15
Thallium	2 and 5	1,000	NA	0.0002	0.2	Ref. 1, p. 51657; Ref. 2, p. B-16
Toluene	2, 4, 5, 6, and 7	10	1	NA	10	Ref. 2, p. B-16
Toxaphene	6	1,000	0.002	0.0002	2	Ref. 1, p. 51657; Ref. 2, p. B-16
1,2,4-Trichlorobenzene	1, 4, 5, 6, 7, and 8	1,000	1	NA	1,000	Ref. 2, p. B-16
1,1,1-Trichloroethane	6	10	1	NA	10	Ref. 2, p. B-17
Trichloroethene	1, 4, and 6	10	1	NA	10	Ref. 2, p. B-17
2,4,6-Trichlorophenol	4, 6, and 5	10	0.2	0.0002	2	Ref. 1, p. 51657; Ref. 2, p. B-17
Xylenes (total)	1, 4, 6, and 7	10	1	NA	10	Ref. 2, p. B-17
Zinc	1, 2, 3, 4, 5, and 8	10	NA	0.0002	0.002	Ref. 1, p. 51657; Ref. 2, p. B-18

Notes:

NA NA has been used to denote information that is not available or not appropriate to a specific substance.

Aroclors are PCBs and as such have been given the values for PCBs that are presented in SCDM (Ref. 2).

Of the various hazardous substances available to migrate via the air migration pathway, 1,2,4,5-tetrachlorobenzene and mercury have the greatest toxicity/mobility factor value (Ref. 2, p. B-15). The combined toxicity/mobility factor value for 1,2,4,5-tetrachlorobenzene and mercury is 2,000. Thus, a value of 2,000 has been assigned to the toxicity/mobility factor value for the air migration pathway.

Toxicity/Mobility Factor Value: 2,000

6.2.2 Hazardous Waste Quantity

The following table presents information about the quantity of hazardous waste associated with each source that has a containment value greater than zero.

Source Number	Source Name	Source Hazardous Waste Quantity Value	Is Source Hazardous Constituent Quantity Complete?
Source 1	CS-A	8,009.62	No
Source 2	CS-B	8,400	No
Source 3	CS-C through CS-E	>0	No
Source 4	G	74.12	No
Source 5	H	92.12	No
Source 6	I	245.38	No
Source 7	L	584.62	No
Source 8	M	4,553.85	No
Source 9	N	32.03	No
		Total: 21,991.74	

The sum of the hazardous waste quantity values for all sources is 21,991.74. The hazardous waste quantity factor value has been assigned according to Table 2-6 of the HRS Final Rule (Ref. 1, p. 51591).

Hazardous Waste Quantity Factor Value: 10,000

6.2.3 Waste Characteristics Factor Category Value

A variety of hazardous substances are available to migrate to the air pathway from the sources at the Sauget Area 1 site (see the table included in Section 6.2). The hazardous substances 1,2,4,5-tetrachlorobenzene and mercury have the greatest toxicity/mobility factor value (2,000), which is the value assigned to the air pathway. The product of the toxicity/mobility factor value and the hazardous waste quantity factor value is 2×10^7. Using Table 2-7 of the HRS Final Rule (Ref. 1, p. 51592), a waste characteristics category factor value of 56 has been assigned to the air pathway at the Sauget Area 1 site.

Toxicity/Mobility Factor Value: 2,000
Hazardous Waste Quantity Factor Value: 10,000
Waste Characteristics Factor Category Value: 56

6.3 TARGETS

No Level I air concentrations have been documented at the Sauget Area 1 site. However, because an observed release by direct observation has been documented at Source 6, Level II concentrations have been documented at Source 6. The following paragraphs present information about targets within a 4-mile radius of the Sauget Area 1 site.

Level I Concentrations

No Level I concentrations of hazardous substances have been documented within a 4-mile radius of the Sauget Area 1 site.

Level II Concentrations

Because an observed release has been documented at Source 6, targets located at the source are subject to Level II concentrations of hazardous substances. On September 20, 1989, a five-man drilling crew working at Source 6 was exposed to vapors that were released when a drum was augured through during drilling. Mr. Robert Gusman, a member of the crew who was working directly over the boring, immediately reported experiencing dizziness and tightness in his chest. Mr. Gusman was taken to the Cerro Copper infirmary and then transported to Alexian Brothers Hospital in St. Louis, Missouri, from which he was released on September 22, 1989 (Ref. 19, p. 1; Ref. 20, p. 1).

Actual Contamination Distance Categories

All members of the five-man drill crew working on Source 6 have been scored as being exposed to Level II concentrations of hazardous substances. There are no on-source residents or workers located at Source 6.

Potential Contamination Distance Category

All targets within a 4-mile radius of the site have been scored as being exposed to potential contamination.

6.3.1 Nearest Individual

The building or area closest to Source 6 that is regularly occupied is the village of Sauget town hall, which is located immediately adjacent to Source 6 (Ref. 3a, p. 2-24). No residences, schools, or day care facilities are located on Source 6. Therefore, according to Table 6-16 of the HRS Final Rule, a nearest individual factor value of 20 has been assigned to the Sauget Area 1 site (Ref. 1, p. 51661).

Nearest Individual Factor Value: 20

6.3.2 Population

The following subsections discuss the population subject to Level II contaminant concentrations as well as potential contamination emanating from the Sauget Area 1 site.

6.3.2.2 Level I Concentrations

No Level I concentrations were detected at the Sauget Area 1 site; therefore, no targets were scored as being subject to Level I concentrations.

Population Exposed to Level I Concentrations: NA

Level I Concentrations Factor Value: 0

6.3.2.3 Level II Concentrations

Targets on Source 6 are subject to Level II concentrations of an unknown nature. The following table presents information about the population subject to Level II concentrations.

Distance Category (in miles)	Total Population	References
On Source	0	Ref. 21, p. 1; Ref. 20, p. 1

Population Exposed to Level II Concentrations: 0

Level II Concentrations Factor Value: 0

6.3.2.4 Potential Contamination

The most recent census tract data obtained from the U.S. Department of Commerce Census Bureau were used to determine the number of people in each distance category (Ref. 22). Furthermore, the population figure assigned to the 0 to 0.25-mile distance ring includes 1,650 workers at the Cerro Copper and Monsanto Krummrich facilities (Ref. 23, pp. 1496 and 1497). However, worker populations were not counted for the other distance rings; thus, the population figures assigned to these distance rings are biased low. The following table presents information about the population subject to potential contamination.

Distance Category (in miles)	Total Population	References	Population Range	Distance-Weighted Population Value*
0 to 0.25	3,223	Ref. 22; Ref. 23, pp. 1496 and 1497	3,001 to 10,000	1,304
0.25 to 0.5 mile	800	Ref. 22	301 to 1,000	28
0.5 to 1 mile	5,203	Ref. 22	3,001 to 10,000	83
1 to 2 miles	19,143	Ref. 22	10,001 to 30,000	83
2 to 3 miles	40,480	Ref. 22	30,001 to 100,000	120
3 to 4 miles	74,218	Ref. 22	30,001 to 100,000	73

Notes:

* The distance-weighted population value is taken from Table 6-17 of the HRS Final Rule (Ref. 1, p. 51661).

The sum of the distance-weighted population value is 1,691. This figure was divided by 10 to obtain the potential contamination factor value, which is 169.

Population Subject to Potential Contamination: 143,270

Potential Contamination Factor Value: 169

6.3.3 Resources

Fields used for commercial agricultural purposes are located less than 0.25 mile south of Sources 4 and 6 (Ref. 14, p. 8).

Resource Factor Value: 5

6.3.4 Sensitive Environments

The following subsections provide information about sensitive environments within a 4-mile radius of the Sauget Area 1 site.

6.3.4.1 Actual Contamination

No actual contamination has been documented at sensitive environments within a 4-mile radius of the Sauget Area 1 site.

Sensitive Environment Actual Contamination Factor Value: NE

6.3.4.2 Potential Contamination

The following subsections present information about potential contamination of sensitive environments and wetlands within a 4-mile radius of the Sauget Area 1 site. Based on the information presented in these subsections and the calculation method presented on page 51662 of the HRS Final Rule, a sensitive environments potential contamination factor value of 1 has been assigned to the air pathway at the Sauget Area 1 site.

Sensitive Environments

Bald eagles use the southern tip of Arsenal Island for nesting (Ref. 37). The southern tip of Arsenal Island is located 3 miles from Source 3, which is the closest source to the island. Bald eagles are a federally listed endangered species (Ref. 31, p. 85). The following table presents information about the sensitive environments within a 4-mile radius of the Sauget Area 1 site. Sensitive environment rating values were obtained from Table 4-23 of the HRS Final Rule (Ref. 1, p. 51624).

Sensitive Environment	Distance Category (miles)	References	Sensitive Environment Rating Values
Bald Eagle Nesting Site	3 to 4	Ref. 37	75

Wetlands

Several wetlands have been identified within 2 miles of the Sauget Area 1 site. The following table presents information about wetlands located within 2 miles of the Sauget Area 1 site. Wetlands were not counted for the 2 to 3-mile and 3 to 4-mile distance rings because the large number of wetlands on the east side of the Mississippi River would require an unusually large expenditure of time and would not significantly affect the sensitive environments potential contamination factor value. All wetland acreage was estimated using the acreage guide provided on the National Wetlands Inventory map and an American Map Corporation map measurer (Refs. 25, 63). Wetlands that are located near each other were grouped together as under a single wetland name. These include Wetlands N, O, P, Q, R, T, U, V, W, and X. Acreage for Wetlands N and X was obtained by measuring the total number of acres within a given area containing wetlands that are useable for HRS scoring purposes, wetlands that are not useable for HRS scoring purposes, and non-wetland areas. Because this composite acreage contains areas that may not be counted as sensitive environments, the total acreage

of Wetlands N and X was divided by 2 to estimate the total sensitive environments acreage within these areas.

Distance Category (miles)	Wetland Name	Wetland Acreage	References
0 to 0.25	Wetland A	5.0	Ref. 25
	Wetland B	3.5	Ref. 25
	Wetland C	1.0	Ref. 25
0.25 to 0.5	Wetland A	5.0	Ref. 25
	Wetland D	4.5	Ref. 25
0.5 to 1	Wetland E	17.0	Ref. 25
	Wetland F	27.5	Ref. 25
	Wetland G	30.0	Ref. 25
	Wetland H	3.2	Ref. 25
	Wetland I	4.0	Ref. 25
	Wetland J	10.0	Ref. 25
	Wetland K	8.0	Ref. 25
	Wetland L	22.0	Ref. 25
	Wetland M	6.0	Ref. 25
1 to 2	Wetland F	47.5	Ref. 25
	Wetland G	50.0	Ref. 25
	Wetland L	22.0	Ref. 25
	Wetland M	2.0	Ref. 25
	Wetland N	120.0	Ref. 25
	Wetland O	53.0	Ref. 25
	Wetland P	89.0	Ref. 25
	Wetland Q	5.5	Ref. 25
	Wetland R	16.5	Ref. 25
	Wetland S	44.0	Ref. 25
	Wetland T	17.0	Ref. 25
	Wetland U	23.0	Ref. 25
	Wetland V	7.0	Ref. 25
	Wetland W	6.0	Ref. 25
	Wetland X	90.0	Ref. 25
	Wetland Y	8.5	Ref. 25
2 to 3	NA	NA	NA

Distance Category (miles)	Wetland Name	Wetland Acreage	References
3 to 4	NA	NA	NA

The following table presents information about the sensitive environments score for the air pathway at the Sauget Area 1 site.

Distance Category (miles)	Sum of Sensitive Environment Values (S_j)	Total Wetland Acreage Within Distance Category	Wetland Acreage Value (W_j)*	Distance Weight (D_j)**	$D_j(W_j + S_j)$
0 to 0.25	0	9.5	25	0.25	6.25
0.25 to 0.5	0	9.5	25	0.054	1.35
0.5 to 1	0	127.7	125	0.016	2
1 to 2	0	601	500	0.0051	2.55
2 to 3	0	NA	NA	0.0023	0
3 to 4	75	NA	NA	0.0014	0.105
					Total: 12.255

Notes:

* The wetland acreage value was obtained from Table 6-18 of the HRS Final Rule (Ref. 1, p. 51662).

** Distance weights for the air pathway were obtained from Table 6-15 of the HRS (Ref. 1, p. 51661).

A total of 12.255 distance-weighted points have been assigned for the potential contamination of sensitive environments within a 4-mile radius of the Sauget Area 1 site. This sum was then divided by 10, and the quotient was rounded to the nearest integer. Thus a sensitive environments potential contamination factor value of 1 has been assigned to the Sauget Area 1 site.

Sensitive Environments Potential Contamination Factor Value: 1